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THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

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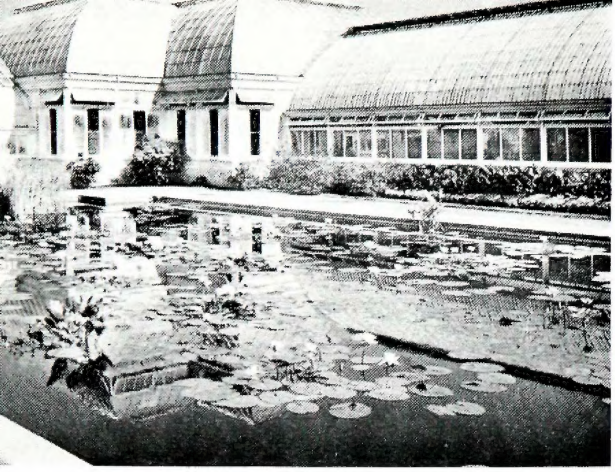

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THE NEW YORK BOTANICAL GARDEN

DOROTHY EBEL HANSELL
Editor

CALENDAR

January 4, 11, 18, 25, 1962. Downtown Lecture Series, sponsored by the Volunteer Associates of The New York Botanical Garden.

January 16, 1962, 6:00 P.M. Annual Meeting and Dinner of the Torrey Botanical Club, Men's Faculty Club, Columbia University. Dr. William C. Steere will deliver his presidential address: "Bryophytes in Experimental Research."

March 1 2, and 3, 1962. Convention of American Camellia Society, Shreveport, Louisiana, at time of the Camellia Show staged annually by Men's Camellia Club in State Exhibit Buildings; also tour to Hodges Gardens in central Louisiana.

March 10-18, 1962. International Flower Show, Coliseum, New York, N. Y.

March 11-17, 1962. Spring Flower Show, Commercial Museum, Philadelphia, Pa.

March 17-25, 1962. New England Spring Flower Show, Wonderland Park, Revere, Mass.

March 18-23, 1962. Symposium on "The Joys of Gardening" at Colonial Williamsburg. Reservations should be made with Mrs. Mary Depp, Goodwin Building, Williamsburg, Va.

April 4, 1962. Members' Evening of The New York Botanical Garden, Essex House, New York, N. Y.

April 8-11 1962. Seventeenth Annual Horticultural Congress, Norfolk, Va. Headquarters: The Golden Triangle Motor Hotel.

April 21-28, 1962. Historic Garden Week in Virginia, sponsored by The Garden Club of Virginia. Proceeds devoted to the restoration of grounds and gardens of historic shrines in Virginia of national importance. For information, write Room 3, Mezzanine, Hotel Jefferson, Richmond 19, Va.

April 27-May 7, 1962. Floralies, International Horticultural Exposition under auspices of Société d' Horticulture and Jardin Populaires de France in Valenciennes, France.

April 29-30, 1962. Louisiana Festival of Roses, sponsored by The Louisiana Garden Club Federation, at Hodges Gardens near Many, Louisiana.

May 1 and 2, 1962. "Tally-ho"—tour and show of The Garden Club of New Jersey (Bedminster-Peapack-Gladstone area).

May 14-16, 1962. Annual meeting of the Herb Society of America at Washington, D. C.; headquarters, Marriott Hotel. Hostess—The Member-at-Large Unit of the Society; Mrs. S. J. Neiburg, Paxton, Ill., Chairman.

May 17, 1962. Ninth Annual House and Garden Tour, benefiting the Institute of Physical Medicine and Rehabilitation of New York University Medical Center, in Westchester County, N. Y., and Connecticut.

August 31-September 8, 1962. Sixteenth International Horticultural Congress, Brussels, Belgium.

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We are indebted to the Display Committee, Mrs. Charles Burlingham, Chairman, for the selection of the front-cover illustration—Within the Conservatory of The New York Botanical Garden by Gottscho-Schleisner, Inc.; pp. 2, 3, 4, 5, 6, Charles C., Clare, Jr.; pp. 8, 10, 11, Herman F. Becker; p. 9, E. N. Mitchell; pp. 13, 14, 15, Pierre Dansereau; pp. 17, 18, 19, Clarence L. Hay; pp. 20, 21, 22, Saratoga Horticultural Foundation, Saratoga, Calif.; pp. 23, 24, courtesy Sunset Magazine, Darrow M. Watt, photographer; pp. 25, 26, 27, Marjorie Wihtol; p. 30, E. N. Mitchell; pp. 32, 33, Carnegie Institute of Technology; p. 39, George W. Park Seed Co.

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SCIENCE LENDS A HAND TO THE BUSY GARDENER

By WILLIAM CAMPBELL STEERE

Dr. Steere, the Director of The New York Botanical Garden, delivered this paper at the sixteenth annual American Horticultural Congress, held at Northampton, Massachusetts, in October, 1961, under the auspices of the American Horticultural Society.

WE LIVE IN A SCIENCE-FICTION AGE. The impact of science and technology on the busy gardener—and on everyone else—will become increasingly pervasive through the years, rather than less so. The press and other national media of communication are dominated today by news of physical sciences and engineering, especially atomic explosions and space vehicles. Nevertheless, we can find an equal amount of interest and excitement in modern developments in the plant sciences that have been or can be adapted to practical every-day needs. Very recent basic discoveries by botanists, some of them not yet published in the professional journals, but known only from reports presented this year at national meetings of scientists, will sooner or later bring even more remarkable developments.

The impact of modern science on the activities of the busy gardener is so wide-ranging that extensive preliminary pruning of my topic is essential, for reasons of time and space. Although the work of the plantsman has been reduced enormously through mechanization—power mowers, rototillers with multitudinous attachments, irrigation and spraying equipment, and all the other fascinating tools and gadgets that fill the advertisements of the trade magazines—I must exclude this large and important topic right at the beginning. Other important topics, too, must be omitted or passed over lightly.

Trade names change day by day, new items appear and old ones disappear, and the more ardent gardeners tend to defend some chosen product or practice by emotion rather than by logic. Because of these variables, I propose to offer no prescriptions or practical advice, nor to take sides, but to devote my remarks to general scientific principles and their modern applications. Although specific chemical compounds and practices will be referred to occasionally, the gardener is recommended, for the solution of his immediate or special problem, to the reliable trade journals, to the excellent new texts on plant pathology, weed control, and economic entomology, or to the appropriate specialist at the nearest institution.

HOW SCIENCE WORKS

The horrendous combination of the atom bomb, science fiction, horror movies on TV, and the increasing pressures that technology has placed on our lives, has unfortunately damaged the image of the scientist in the popular mind, to such an extent that he seems a very remote or even sinister person. As a scientist myself, I have no choice but to defend science and its practitioners! The scientist doing basic research is so immersed in his work and so insulated from the public that he tends to be much more interested in the discovery of new data than in the practical application of his results. The chemist who prepares a new compound in his laboratory is almost never the man who determines its effect on plants or animals. Again, in turn, the biochemist or physiologist who does test the new compound will be more interested in the interaction between the compound and the organism than in any practical or commercial application. As a consequence, the communication of information or data from the scientist to the busy gardener may be not only quite indirect but also rather slow because of the several steps.

THE APPLICATION OF BASIC RESEARCH DISCOVERIES

Fortunately, the discoveries made by the scientist become public property the very moment he publishes them in a professional journal, and immediate practical application may be sought by any one of several types of organizations. The laboratories of the United States Department of Agriculture at Beltsville, Maryland, and its subsidiary stations elsewhere, as well as federal, state, and private agricultural experiment stations through the United States, carry on extensive experimental programs for the benefit of agriculture, in the broadest sense. The plant-science departments—botany, horticulture, floriculture, pomology, agronomy, plant pathology—of the many agricultural colleges likewise carry on much applied and developmental research.

Private industry also supports an enormous program of applied research aimed at the practical application and commercial development of new products to help the gardener—not to mention the profit motive. Almost every large chemical company—and many small ones—have a research and development laboratory, and "R and D" has become a household term in all industry. Besides the research that is carried on in its own laboratories, industry also supports research on and testing of its products in experiment stations, agricultural colleges, and independent research laboratories. Like the multiple naming of the same compound by the different drug and pharmaceutical houses, we find a bewildering maze of trade names for the overwhelming flow of new weed-killers, insecticides, hormones, and other useful products. At last, however, the delivery of the information from the scientist to the busy gardener has been completed. Not infrequently, the scientist is also the busy gardener in his spare time!

Some discoveries by scientists need only common sense in order to develop a useful application, instead of well-equipped laboratories and complex instrumentation. One such application that may eventually be found useful even in our climate is so interesting and such a good example that it deserves inclusion here. In several of the West Indian islands, a fly resembling our botfly produces a larva

or maggot, the screw-worm, that burrows into the flesh of cattle. These infestations seriously impair the health of the animals affected and may even kill them, and so are of considerable economic importance. Entomologists knew that the male flies are attracted by specific chemicals, just as are Japanese beetles and many other insects. For years, the males were trapped and killed without reducing perceptibly the total population of flies. However, it was also known that these flies mate only once during their lifetime, and here the common-sense application entered. Instead of being killed after they were trapped, the male flies were sterilized by irradiation and then turned loose again. Every sterile male fly that mated thereby prevented the development of a large progeny of screw-worms, and in only a few years the problem has been significantly abated. Many other scientific discoveries have depended for their application only on the intelligent combination of several bits of basic knowledge, each one usually available long before.

Other scientific discoveries are so abstruse or so far ahead of the technology of the times that the engineer or developer can see no practical use for them, and they lie fallow for years or decades. The basic scientific theory that made the atomic bomb possible was published before the turn of the century, but the actual development took several years, even under wartime pressures, to translate the idea into the skills and the machinery to split the atom. This too-well-known historic feat illustrates the difference between the "know" and the "know-how."

The discovery and the development of DDT during the war for the protection of our armed forces from disease-carrying insects, especially mosquitoes, resulted from the application of modern methods to the finding of the best product as rapidly as possible. Tabulations of the effects of literally thousands of chemical compounds on many types of insects were fed into data-processing machines for mathematical analysis, and in a relatively short time, DDT was indicated as the most effective compound, as of that moment. Without data-processing machines and computers, the mathematical analysis would have taken years to complete, and we might not today have DDT and the improved compounds that have followed it.

Plant Hormones

The discovery of plant hormones has revolutionized the field of plant physiology, and their synthesis and useful application have brought a parallel revolution to agriculture and horticulture. A generation or so ago, the idea that plants might possibly have hormones was scoffed at by all but a dedicated few. The idea soon became a reality, however, and plant growth substances, or auxins, were isolated, identified, and eventually synthesized. The die-hards of thirty years ago, who refused to believe in plant hormones, would be embarrassed indeed to see today the tank-car lots of synthetic growth substances that are available to stimulate plant growth or to inhibit it, on order. Growth substances are used to kill plants, to dwarf them, or to make them larger. They are used to defoliate cotton in the field to make the harvest easier, to thin out flowers and fruit of apples, to prevent pre-harvest drop of fruit, to root cuttings, and in hundreds of other special ways that previously required much time and hand labor—if the job could be done at all.

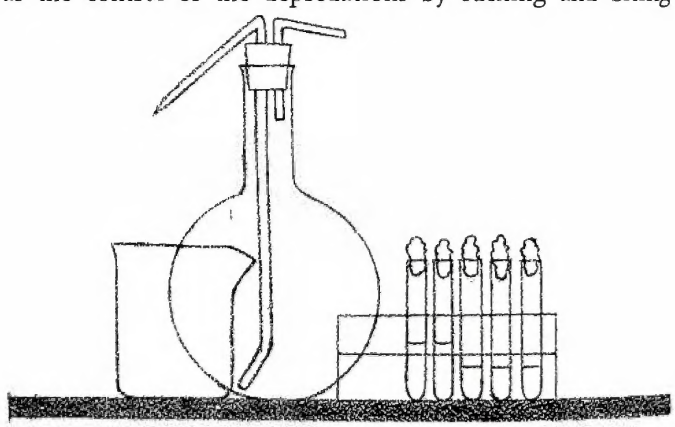
The phenomenal development of weed killers into a multi-million-dollar business—even in its infancy—gives us much hope for increasing the production of cultivated plants by reducing or eliminating competition by weeds. Some of us think of weeds as personal afflictions—the dandelions and crab-grass in our lawns, the Japanese honeysuckle and poison ivy amid our shrubs, and the ragweed in the vacant lot next door. Few Americans realize that weeds in our fields and on our range lands cause an annual loss of national income amounting to several billions of dollars. With this perspective, and with the modern-day availability of chemical weed-killers, any gardener can not only control weeds among his flowers and vegetables with a minimum of effort, he can also help at the same time toward the eradication of these pests in general.

With the continuing discovery of increasingly specific herbicides, the future holds good promise for chemicals that will destroy any single species of weed without harming the cultivated plants among which it grows and with which it competes. On the other hand, it will be advantageous to develop a single herbicide to control all weeds in any type of situation. Already, the chemical control of weeds in nursery plantings is reported to be cheaper, more convenient, and less injurious to nursery stock than the usual hand methods.

In spite of the large amount of basic research on growth-stimulating substances, both those found naturally in plants and the synthetic ones, our knowledge of the way in which the hormone acts to affect the metabolism of the plant is by no means complete. Basic investigations on this fascinating and fundamental topic continue in many botanical research centers, whereas the practical applications are being worked out at experiment stations, agricultural colleges, and in the laboratories of the chemical industry. Because of the dramatic and spectacular effectiveness of weed-killers the need for them is obvious, and so they have become real money-makers. As a consequence, the chain of communication here between the scientist and the gardener is an unusually direct one, as new discoveries in the laboratory are rapidly translated into commercial products available to everyone.

Control of Diseases and Pests

The control of plant diseases caused by fungi as well as the control of the depredations by sucking and biting



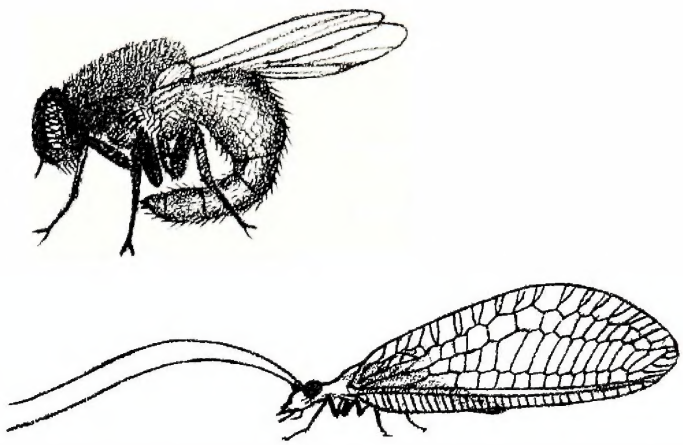
insects is of transcendental importance to our enormous agricultural enterprise. All living plants imported into the United States must be inspected for disease on arrival, and many kinds are wholly prohibited from entering the country because of the danger of bringing in new diseases. At Glenn Dale, Maryland, near Washington, D. C., plant introductions are established, propagated, and grown under observation by the United States Department of Agriculture before being distributed to plant breeders at experiment stations and research institutions. As many as seven thousand plant introductions are held at Glenn Dale at one time, and many of these new plants will enrich our gardens within the next few years, free of the fungi and insects that may have accompanied them originally.

Fungus diseases are undoubtedly the largest single cause of crop losses in this country, excepting an unusual year of drought or flood. Plant breeders and plant pathologists have teamed up to develop races of cultivated plants resistant to disease, a much more effective approach than trying to spray or dust vast acreages. Nevertheless, just this year the United States Forest Service reported the successful use of antibiotics against the white pine blister rust, a fungus that could be deadly to millions of trees, with a national loss of billions of dollars.

The newest approach to the control of insects is by the use of systemic insecticides, applied through the soil to the roots of plants. Upon attacking the plant, the insect is poisoned directly. The potential of this approach is enormous because of its specificity and especially because it removes the dangers attendant upon spraying or dusting poisonous compounds in large quantities. Already, even in the pioneer days of systemic insecticides, we have reports of the control of leaf miners on holly and boxwood, of lace bugs on andromeda, azalea, and rhododendron, and of leaf hoppers on maples.

A common-sense approach to the control of insects, used for years with success, has been the encouragement of predators on insects that destroy plants. The effectiveness of the common lady bug as a predator on aphis, thrips, mites, and other pests on many kinds of plants, has long been known. An Australian relative of the lady bug, imported to California more than thirty years ago, destroyed the scale insects in the citrus orchards and thereby saved the industry from ruin—a classic example. Today, the two-spotted spider mite is a highly destructive pest in commercial greenhouses. Worse, it develops immunity to chemical sprays and fumigants, and even passes the immunity along to its offspring. Fortunately, entomologists in the United States Department of Agriculture have discovered and tested two species of predator mites that feed on the eggs, the young, and the mature spider mites. When the supply of spider mites is exhausted, the predator mites then devour each other, so that the greenhouse must be resupplied each year. Other effective predators on destructive insects are certain to be discovered within the next few years because of the efficacy of the technique. Fungi parasitic on one or more stages of specific insects have been successfully used for control and furnish another tool with a great potential.

Nematodes are probably the most numerous animals in the world and occur in astronomical numbers in every



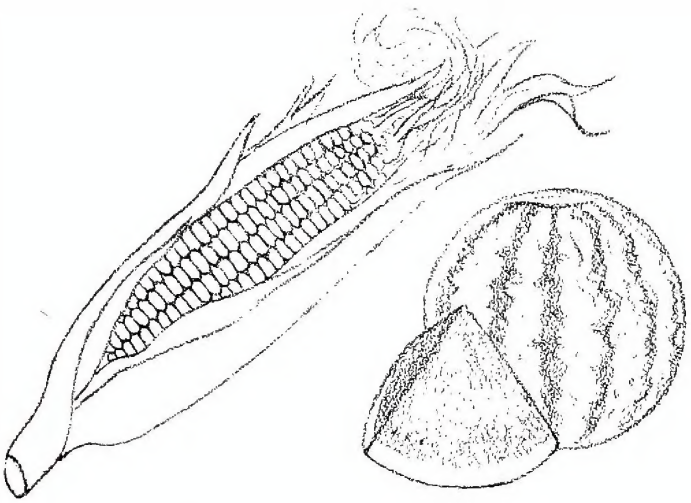
piece of soil. Some species cause important root diseases of plants, to such an extent that once the soil becomes infested with nematodes, many plants cannot be grown successfully in it. The March, 1961, issue of *Agricultural Research* reports that table sugar is one of the most effective—and most surprising—nematode killers ever discovered. Investigations at the U.S.D.A. branch at Orlando, Florida, showed that, when mixed with nematode-infested soils at only one to five per cent by weight, sucrose killed up to one hundred per cent of the nematodes within twenty-four hours, by dehydrating them. The laboratory results, already confirmed in the greenhouse and in the field, will be especially important in controlling nematodes that attack okra, corn, citrus, and many other cultivated plants.

The field of pest control is large and complex, but scientists have already done much to help the busy gardener. The literature on the latest fungicides, insecticides, and pesticides is much too large even to summarize here.

Genetics and Plant Breeding

Scientists have contributed greatly to human welfare through the field of genetics, the science of heredity. Applying the principles of genetics as they were discovered, plant breeders have produced new kinds of plants as well as more efficient plants. Techniques for producing new varieties vary, depending on the plant and on the practitioner. The oldest method, practiced on domestic animals and crop plants since the dawn of civilization, has been the selection of individuals with desirable characteristics and the discard of individuals with undesirable ones, and is based simply on the natural range of variability inherent in all organisms. The end result of selection may be quite different from the parent stock, as is easily seen by comparing our common cultivated plants with their wild relatives. Selection, however, brings results very slowly and may need many generations to reach the level of improvement desired. The limiting factor in selection, of course, is that one must select from among characteristics, and their range of variation, already present—nothing new can be introduced by selection alone.

Even before heredity was understood and the science of genetics founded, the importance of hybridization in bringing new characteristics to crop plants and domestic animals was realized, and until recently, hybridization had become the predominant method for improving old varieties and producing new ones. The development of hybrid corn ad-



vanced enormously the efficiency of this plant in producing grain—and surpluses. In spite of the almost miraculous success of hybrid corn, the same technique of crossing two highly inbred lines to produce an F_1 progeny of great vigor and homogeneity has not been applied widely to other crop plants.

On the positive side, hybridization permits the introduction of "new blood," the new and desirable characteristics for the improvement of any standard variety. The bringing of rust-resistance to wheat and other grains, the development of new flower colors and types in many horticultural varieties, and the general improvement in late years of the size of garden flowers and vegetables, are only a few of the spectacular landmarks achieved in plant breeding, and we may expect further and continuing successes.

On the negative side, hybrid offspring often show reduced fertility as measured by seed production, and some are totally sterile. Moreover, characteristics of plants are occasionally genetically linked, so that they are inherited in pairs or blocks in such a way that it is difficult indeed to separate them, if one is undesirable. The story is told of the investigator in an experiment station who was trying many years ago to develop a watermelon with better shipping quality by crossing it with the closely related citron. Although he produced beautiful, red-fleshed melons with wonderfully hard and resistant rinds, he could never successfully breed out the strong flavor of the citron. A modern example of this same problem showed up this year in mint, which has been forced out of production on thousands of acres by its high susceptibility to *Verticillium* wilt. Hybridization of mint with a related wild species, *Mentha crispa,* which is highly wilt-resistant, produced hybrids that were also highly resistant. However, these hybrids also inherited the poor oil quality of the wild parent and so were not usable. I wonder if the reduction in fragrance of otherwise highly improved garden flowers may not be a good example of the same phenomenon?

The sudden and spontaneous occurrence of "sports" or mutations in plants and animals has long fired the curiosity and the imagination of man. The recognition and the perpetuation of mutations have resulted in improvement of many cultivated plants. In nature, mutations occur extremely rarely and with no predictability—and few of them are desirable. In the past, they were used by plant breeders who stumbled upon them only by accident and happened to recognize their usefulness.

Scientists have known increasingly in recent years that X-rays and other types of radiation will alter or destroy genes in the chromosomes of plants and animals and thereby produce a "sport" or mutation. The normal rate of mutation in nature, thanks perhaps to cosmic rays and other natural radiation, is about one in one hundred thousand to ten million individuals. By the use of artificial radiation, the rate of mutation can be increased about a thousandfold to one in one hundred to ten thousand individuals, depending on the radiation dosage and the plant. The discovery that radiation greatly increases the rate of mutation and will produce mutations in reasonably predictable numbers has put a wonderful new tool into the hands of plant breeders. Botanists have done much pioneer work on the effects of irradiation on plants in late years at the Brookhaven National Laboratory on Long Island, both under laboratory conditions and out-of-doors in a ten-acre radiation field. Also, the agricultural research laboratory at Oak Ridge, Tennessee, is irradiating woody ornamentals in the hope of developing improved varieties. Through these techniques, the production of mutations by artificial radiation has become a reality, and we may look forward to an ever-increasing pace of progress in the development of new and improved cultivated plants within the next few years. One may now buy irradiated seeds, bulbs, and cuttings "guaranteed" to produce "atomic varieties." Unfortunately, the implications in some of the advertising are such that the busy gardener is almost certain to be disappointed in the actual results realized in his garden, which, in turn, may give him a jaundiced view of science. Actually, considerable scientific progress has already been made through the radiation approach. At Rutgers, irradiation of peach trees has brought about mutations for both earlier- and later-ripening fruit on the same branch, and other desirable mutations affecting the texture of the fruit have been produced. Further beneficial mutations of fruit crops have been reported at other institutions. Because flower-color changes are so easily detected, they have been reported in many garden plants in surprising numbers, and some of them are already in commercial production, especially in carnations. Several improved crop plants have been produced by irradiation and are now being grown commercially in various parts of the world. Among them are white navy beans that give a thirty per cent greater yield on smaller plants; peanuts that are more disease-resistant and have harder shells; and larger tomatoes that ripen earlier. Promising developments are dwarf grain plants with no reduction in yield but less apt to be damaged by wind, tobacco with a lower nicotine content, coffee with less caffeine, and improved disease-resistance in several other crops.

A corollary to the use of atomic energy for the production of mutations desirable for the improvement of cultivated plants, and for other peaceful purposes, is the search now going on for plants that will absorb fall-out radioactive materials most rapidly and with the least harm to man. Plants vary enormously in their ability to take up harmful fall-out materials, especially strontium-90, which appear in the atmosphere as the result of nuclear explo-

sions. At the moment, thanks to new Soviet activities, these investigations suddenly take on great timeliness.

During the present century, scientists have discovered much about the chromosomes that occur in every living cell of plants, and their role as the bearers of the information that determines the nature and development of the plant as well as of its offspring. Most plants have two sets of chromosomes in each cell, one from each parent, and are therefore termed diploid. Plants with more than two sets of chromosomes—polyploids—are not rare in nature. The most common polyploid is the tetraploid, with four sets of chromosomes in its living cells. An important development of late years has been the discovery that tetraploids can be produced almost at will by doubling the chromosome number through treatment with colchicine and other drugs. Because of their more vigorous growth and larger flowers, many tetraploids—"tetras," as they are often called in seed catalogs—have become very popular among gardeners, especially in petunias, irises, marigolds, snapdragons, and delphiniums. One of the most interesting and promising uses of induced polyploidy has been the large-scale commercial production of seedless watermelons from seeds resulting from the cross between diploid and tetraploid melons. In addition to the obvious advantage of no seeds, these hybrids have a flesh of finer texture, an increased sugar content, and much better keeping qualities. Science has thus given the plant breeder a useful new tool that has by no means been used to its full potential. Any gardener with an experimental turn of mind can derive pleasure and surprise for himself by producing and growing artificial polyploids in his garden.

Plant patents, a modern outgrowth of plant breeding, are enormously interesting, as they run the gamut of the plant kingdom from improved mushrooms with better flavor, higher productivity, and greater tolerance of drought, to new and distinct varieties of chrysanthemums—and other higher plants. The report of newly patented plants always makes fascinating reading, as it forecasts accurately the newcomers to our gardens.

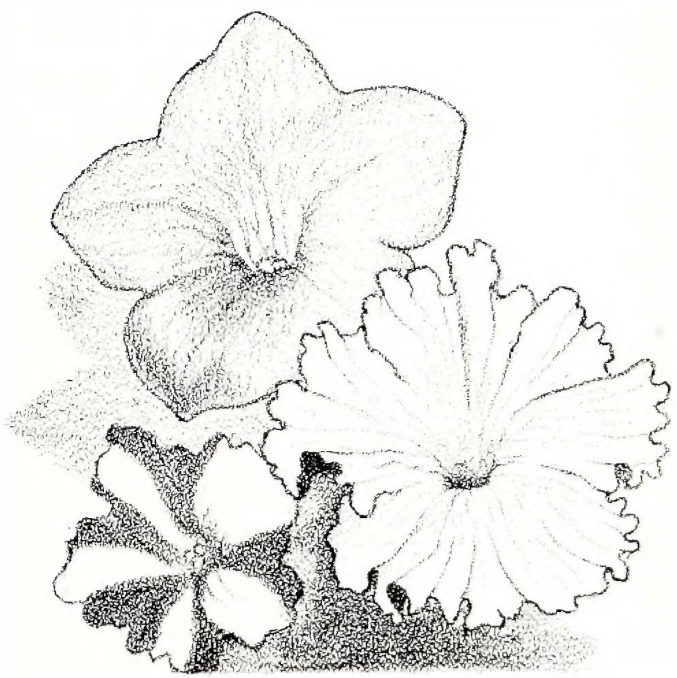
Control of the Environment

As we standardize, develop, and improve our cultivated plants, we become more and more aware of the weakest link in the chain of circumstances upon which the busy gardener has to depend—the highly unpredictable environment. No group of people lives under greater economic uncertainty or under more undependable conditions than the farmers and ranchers of America, who need successful crops for their livelihood. Few other occupations must gamble for their annual income and perhaps for their whole economic future on the climatic vagaries of a single season.

What are the short-term and the long-term solutions to the problem? In the first place, the problem has two distinct aspects, the environment itself, and the reaction of the plant to it. Large-scale control of the environment is far, far in the future, even though the general consensus on the highly controversial topic of increasing rainfall by cloud seeding is mildly but increasingly favorable. Local control of environment, on a relatively small scale, is something else again. Important developments have been the invention of Wardian cases for bringing tropical plants to less favorable climates on the decks of sailing ships; of coldframes and of hotbeds for speeding the development of seedlings and for protecting non-hardy plants through the winter; and of glasshouses to duplicate, hopefully, more favorable climates in order to grow plants otherwise susceptible to cold for scientific reasons, for personal and public pleasure, and to extend the season for commercial production.

Under greenhouse conditions, one can control completely the soil type, and the amount, type, and periodicity of watering. Humidity can be controlled, but not completely, in the normal greenhouse. With artificial light and with darkrooms, one can duplicate artificially the light needs of long-day and short-day plants, even though the intensity and wave length of the light may leave much to be desired—by the plant, that is. Temperatures can be controlled during the winter, of course, but high summer temperatures may be as prejudicial to many plants as low winter temperatures, and we look forward to the development reasonably soon of an air-conditioned greenhouse wtih refrigerated benches for the experimental growing and display of arctic and alpine plants. The Phytotron, conceived and built at the California Institute of Technology by Dr. Frits Went, is a laboratory-greenhouse that permits the scientific investigation of the effects of any single factor, or of different combinations of factors, of the environment on plants. The Phytotron has achieved by far the closest approximation to control of the environment or climate, even though on a relatively small scale.

Although the light and temperature requirements of many plants have been discovered empirically by those who depend upon them for a living—from the farmer raising strawberries and cabbages in the Matanuska Valley of Alaska to the florist forcing bulbs for Easter, in Boston—nevertheless, the whole story is not yet known even to the scientist, except for the general principles. The daylength, or photoperiod, has assumed large importance in



late years, especially with reference to the flowering of plants, but its physiology and biochemistry are still incompletely known. The remarkable effects of extremely small dosages of light, of heat, and even radio waves on seed germination have opened up an interesting field of study. The importance of night temperatures and the relative unimportance of day temperatures in the production of crops of flowers and fruits is still something of a mystery, both to the plant scientist and the commercial producer alike.

A highly controversial topic among gardeners—and among experts—has been the use and effect of plastic mulches for the control of soil temperatures. From extensive studies, the Connecticut Agricultural Experiment Station reports that, in general, a translucent film raises soil temperature both day and night, at and below the surface. Black plastic film has little effect on day temperature but holds a higher night temperature than bare soil. Aluminum-plastic film reduces the soil temperature during the day but keeps it somewhat higher during the night. As a practical result, the translucent film area produced the largest early yield of strawberries, whereas strawberries mulched with hay, which keeps the soil cooler both day and night, eventually produced approximately the same total yield, but much later.

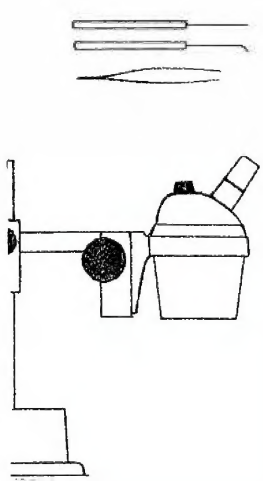
Although the control of climate and of environment on a large scale is still far in the future, we do have some means for controlling environmental conditions on a small and local scale. However, much more research is necessary on the plants themselves before the scientist can make any general statements, much less any general recommendations. Fortunately, current intensive researches on plant hormones and their effects on plants are giving us a growing understanding of the relations between plants and their environment. It may well turn out to be much more practical, eventually—and much easier and cheaper—to modify plants to fit the environment than to change or to control the environment itself.

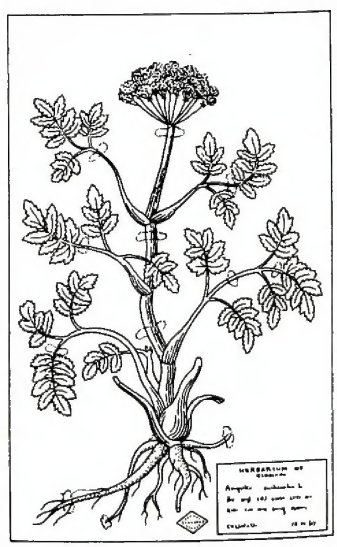
Names of Plants

A baffling area of the plant sciences, to the uninitiated or uninterested person, is the system of naming plants, or nomenclature, used by botanists. The nomenclature of plants is regulated by a set of rules established during the last century to insure the stability of the Latin or botanical names of plants. The one Latin name of any plant is recognized and used by botanists of all countries and of all languages. Common names of wild plants, on the other hand, differ from country to country and from region to region in the same country. If you follow, for example, the name, "Mayflower," around the United States, you will find it applied to dozens of different plants. This example brings me to my primary point, the names of cultivated plants. Every gardener has had the experience of obtaining the very same plant under wholly different names from different catalogues or nurseries—or different plants under the same name. It is not wholly unknown for dealers to "turn a fast buck" by re-naming some well-known plant in long supply and then making remarkable—but unsupportable—claims on behalf of their "novelty," in order to sell it. The misuse and improper use of the names of horticultural plants, either by accident or design, by those who sell them, make a confusing problem for the gardener. Fortunately, the scientist is now coming to his rescue. The latest version of the *International Code of Nomenclature for Cultivated Plants* was published in June of this very year, with financial support from UNESCO and the International Union of Biological Sciences. The Code states in clear terms the rules to be followed in the creation and use of the names for cultivated plants. In this country, large collections of woody plants, both naturally occurring species and their horticultural forms and varieties—cultivars—are being grown in botanical gardens and arboretums. Everyone who hears or reads these remarks will know the Arnold Arboretum and its magnificent collections of cultivated woody plants widely used in horticulture. At the same time that collections of living plants are being brought together by the Arnold Arboretum and other institutions, botanists and horticulturists are compiling and publishing lists of the names that have been applied to various important groups of cultivated plants. Also, many experiment stations maintain collections of the standard cultivars of crop plants. Eventually, each named variety of cultivated plant will have only one name, and much of the confusion now attached to horticultural names of plants will disappear. This is not a glamorous or spectacular corner of science, but it does give some insight into the concern that botanists have for the correct use of and the regulation of the names for cultivated plants. Who knows but that the busy gardener may eventually save more time, trouble, and frustration by a standardization of the names of cultivated plants than by a new weed- or bug-killer?

Looking Ahead

What are the areas in which we should anticipate that science may come to the aid—or the rescue—of the busy gardener in the near or distant future? At the moment, there is no known treatment for the cure or alleviation of virus diseases of plants, although the transmission of virus may be reduced by controlling the insects that carry the infective particles and perhaps in other ways. However, biologists and chemists are on the verge of a major breakthrough in understanding the fundamental nature of the





virus molecule—how it divides, parasitizes the living cell, and causes the visible manifestation of disease. With this fuller understanding will also come the eventual discovery of methods for limiting or preventing the growth of virus in living organisms, where this is undesirable.

Today's most spectacular and curious type of gardening is one in which I hope none of us ever becomes involved, as it concerns itself with the culture of algae, or of suspensions of single cells of higher plants, aboard space vehicles. The purpose of these cultures—a specialized form of gardening, indeed—is multiple: to absorb carbon dioxide from the respiration of the missile's passengers and to transform it into oxygen through the process of photosynthesis, to reduce and to purify human wastes by other metabolic processes, and eventually to serve as a source of vitamins, if not of food itself. When we contemplate the problems of adapting plants to their wholly undependable climate and environment on our own strife-torn planet, even with the experience of many centuries, we can appreciate better many of the problems confronting a crash program to establish multipurpose cultures of plants aboard space vehicles, which will be subjected to totally unknown and unpredictable environmental conditions.

With increasing research on the fundamental problem of why one organism can become a parasite on another, and the development of methods for controlling disease-producing fungi, we should see such plant maladies as the Dutch elm disease that at present spread destructively and unchecked brought under control.

We shall certainly see, not too far in the future, new and more effective means for controlling destructive insects, with the highly beneficial added attribute that they will not harm birds, fish, or other animals, as some present sprays and dusts may do. Physiologists have discovered that the juvenile form of some insects, if treated experimentally with hormones that keep them in the immature stage beyond a certain point, are unable to undergo metamorphosis—the transformation into the mature, reproductive stage. At the moment, the hormone is derived from the insects themselves and is known only in infinitesimal quantities. However, the preparation of synthetic juvenile hormones on a commercial basis and the development of adequate methods of application will put a brand new tool into the armamentarium of the plant pathologist.

In spite of the enormous contribution that science has made to the knowledge and use of plant hormones during recent years, important new discoveries will add significant new benefits. The hormone that controls the time and duration of flowering in plants has been identified only very recently, and, when eventually synthesized and marketed, will revolutionize the life of the busy gardener and the commercial floriculturist alike. Imagine the sense of security that will be derived from the ability to control and to predict the flowering of our own prize plants! Some progress has been made in the use of plant hormones to control the time and duration of fruit production, but refinements and extension in this area will be helpful indeed to the gardener. Other plant hormones now under investigation are known to improve the color, texture, and flavor of fruits.

We have in plant hormones a long series of remarkable natural and synthetic chemical compounds that somehow have the ability to affect the most fundamental and significant metabolic activities of the plant cell. Because of the access to and the effect on the very basis of life by growth substances, it is not preposterous for us to envision our eventual control of many other physiological characteristics of plants—to increase their tolerance to cold, to heat, to sun, to shade, or even to think of developing hardiness in plants now restricted to the tropics.

Recent experiments point to the eventual possibility of directed mutations, induced for a specific purpose, rather than random mutations, good and bad. The long-term possibility of the combination of made-to-order mutations in the direction desired, with control of metabolic activities—and even of the environment—will enable us to realize from plants a potential not yet dreamed of.

In closing, I want to touch upon a "pet peeve." For many years, I have been affronted by our arrogance in speaking of how we grow plants. Actually, we don't grow plants at all—we just try to provide them with what we hope are the right conditions for the plants to grow themselves. However, just over the horizon is coming a day in which there will be more or less control by us of what the plant does and how it behaves. Perhaps the day will come when we really *do* grow plants!

Believing as I do, in the continuity of nature, I cannot stop abruptly where our microscopes cease to be of use. Here the vision of the mind authoritatively supplements the vision of the eye. By a necessity engendered and justified by science, I cross the boundary of the experimental evidence, and discern in that matter which we in our ignorance of its latent powers, and notwithstanding our professed reverence for its Creator, have hitherto covered with opprobrium, the promise and potency of all terrestrial life.

John Tyndal, in "Fragments of Science,"
Belfast, August 19, 1874.

A view from the Ruby range across the basin, overlooking the fossil localities. The Gravelly range in the distance forms a backdrop to the lake in the left center.

Except for higher elevations of the mountains and denser vegetation, the ancient Ruby basin may not have looked much different from the way it looks today.

THE RESURRECTION OF A LANDSCAPE

By HERMAN F. BECKER

Dr. Becker is Research Associate of The New York Botanical Garden and, under a grant from the National Science Foundation, is continuing his research on the Tertiary Ruby Flora of southwestern Montana.

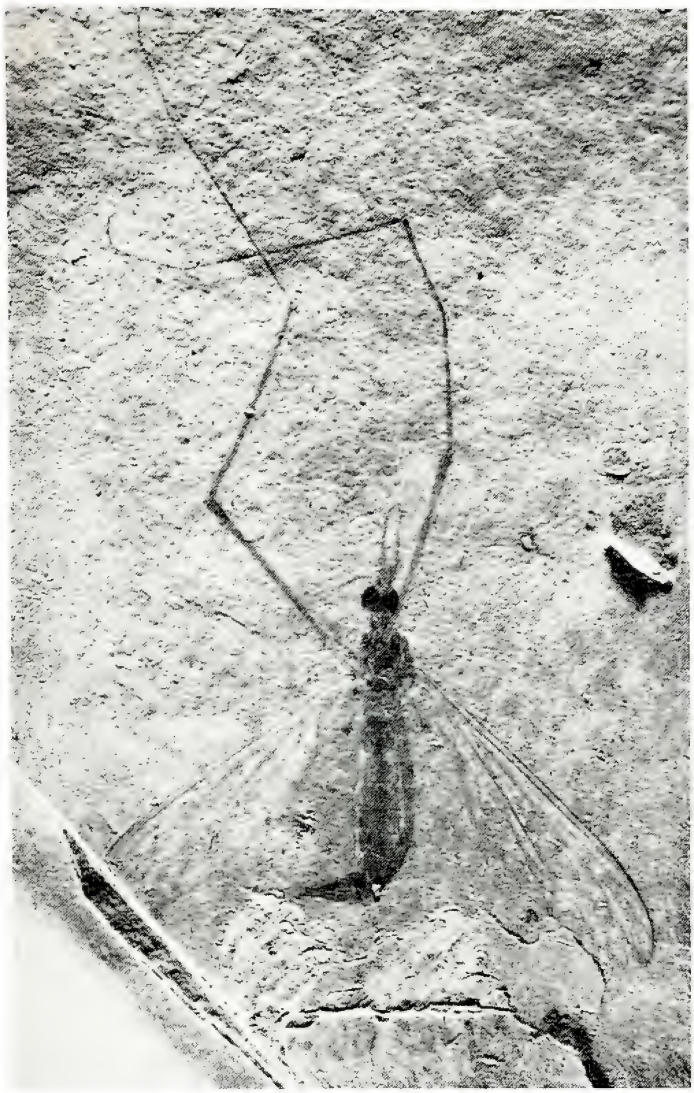
REACTIVATION of the paleobotanical section of The New York Botanical Garden proceeds at a modest pace, particularly because of recent renovations of the Museum and Administration Building and proposed changes of the exhibits. To offset this slowed activity, the entire summer of 1961 was profitably spent on an exploratory and fossil-collecting expedition in the western United States.

The fossil plant and insect localities of the upper Ruby basin area in southwestern Montana* seem well-nigh inexhaustible and reward efforts of search with constant surprises. During 1957 and 1959, new fossil floras were discovered in the gulches with distinct floristic composition and with little relationship to each other. In 1961, yet another notable florule (a unit within a larger flora) came to light, in the field record known as No. 16, but affectionately termed the "badger flora." A good way to discover a fossil flora is to look for tell-tale signs of shale, mostly "float," in creek beds and gulches. It was on the side of one of these V-shaped dry-washes that my attention became focused on a small mound of white chips that glistened in the sun. The material had been pushed out from an ovoid burrow above, the home of a badger. Deep in the recesses of this hole an original shale matrix was recognized *in situ,* demanding immediate investigation. Preliminary digging revealed fragments of leaves and other organic debris on white, silty shale. Toward the end of the week the burrow had become a fossil site, now about ten feet long, five feet high, and quite deep. Many species previously unknown to the Ruby area were recognized. One of these surprises is a fossil with a central, circular structure and radiating lines or veins, apparently the remains of a lotus or water-lily leaf with petiole. This find, together with fish skeletons, scales, and aquatic insect larvae, suggests a tranquil lake environment. While the living insects, particularly mosquitoes, gnats, and wasps often present a bothersome problem today, their numerous fossil ancestors are quite innocuous—they do not buzz or bite or sting, but tell us in all their detailed splendor a story of the living past.

The Ruby shales, some twenty-five or thirty million years old, comprise what we term the Oligocene Epoch of the Tertiary Period. They are finely laminated, indeed they are so thin that a breeze will fling some layers aloft and twirl them lustily like autumn leaves. Such fine material is called paper-shale. It is made of clay and silt and volcanic dust that are periodically washed or blown into a water-filled basin. Leaves and other plant debris are carried into the lake by brooks and temporary streams, are gently deposited, and quickly covered with fine sediments. Perhaps, because of the absence of bacteria or the acidity of the water, some of these leaves did not decay but impressed themselves faithfully between layers of silt. Over a period of thousands, nay millions of years, they left nothing but a film of carbon, a sharp, pencil-sketched replica of their former self. A similar fate befell insects, snails, fishes, and even an occasional bird.

Now we have the setting—a basin cradled between mountain ranges that fed sediment-laden streams into the lake. Thus the fossil shales of thirty million years ago speak a vivid language to those who are candid linguists of the rocks and their hidden treasures. They tell us that the population of fishes fed on plant debris, on aquatic insect larvae, on crane flies, especially abundant during that time, on damsel, May, and caddis flies, on snails, and probably also on their own kind. Fossil cattails *(Typha),* sedges *(Carex),* horsetails *(Equisetum),* pondweed *(Potomageton),*

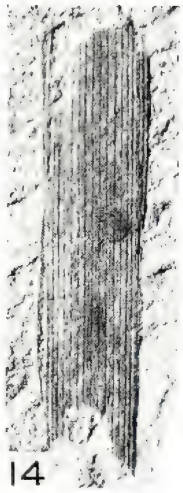
*1) Paleobotany at The New York Botanical Garden. **The Garden Journal,** Jan.-Feb., 1960.
2) Bird Taming in Montana. **The Garden Journal,** May-June, 1960.



Above. A fossil crane fly. Note the claws in the legs and halteres. Upper right. Wing of a may fly. Note the delicate crossbars. Lower right. Ichneumon fly from the paper shales.

false mermaid *(Floerkea),* and some liverworts suggest a typical temperate lake flora, much as we find it today. The elongate lake, hemmed in by towering mountains of the Ruby and Gravelly ranges, was doubtless one of the dominant features of the ancient Ruby landscape.

Let us, as we would today, leave the marshy shores of this "fossil" lake and wander upstream along one of the permanent tributary brooks. These watercourses were filled with a colorful assortment of pebbles, and farther on with rounded boulders of granite, schist, basalt, and polished quartz. Small fishes darted here and there, foraging wading birds occasionally dislodged a "waterpenny," the larva of the riffle beetle that clings tenaciously to submerged rocks. Mosses and ferns along the bank sought the dampness and shade provided by overhanging willows, alders, and vines. A lurking robber fly darted up suddenly to catch a passing flower fly or a May fly, then alighted on a nearby poplar for a leisurely meal. Grasshoppers abounded, and a host of bugs and beetles, earwigs, leafhoppers, lantern flies, mosquitoes, ants, bees, and wasps populated the nearby forest. They fed, bred, and sought shelter among maples, beeches, dogwood, ironwood, and ailanthus, among elms,



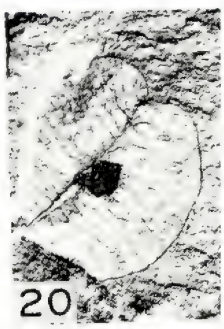
10. Pinnule of *Osmunda occidentalis*, ancestral to the royal fern, and a short shoot of the dawn redwood, *Metasequoia occidentalis*.

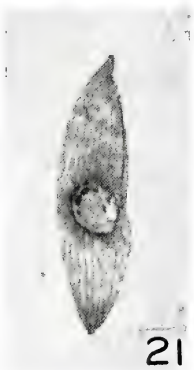
11. Short shoot of *Metasequoia occidentalis*.

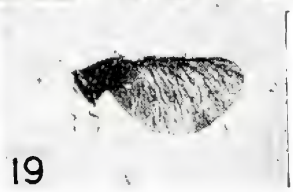
13. Cluster with four needles of *Pinus tetrafolia*.

14. Piece of leaf of a cattail, ***Typha lesquereuxi***.

17. **Pistillate cone of the dawn redwood,** *Metasequoia occidentalis*.







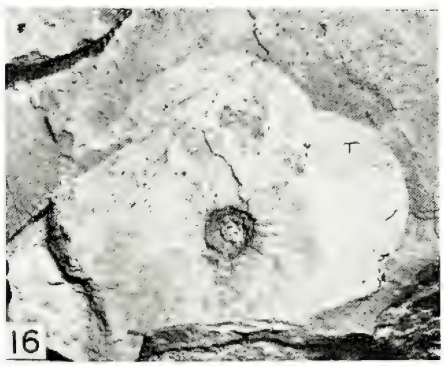
18. *Rosa hilliae* leaves with stipules and three and five leaflets.

19. Leaf and samara of a maple, *Acer florissanti*.

20. A winged fruit of the golden-rain tree, *Koelreuteria arnoldi*.

21. A winged fruit of the tree-of-heaven, *Ailanthus americana*.

15. The penny-cress, *Thlaspi primaevum* (fossil, left) and *T. arvense* (living, right).



16. Calyx of *Holmskioldia speiri*, a verbenaceous vine.

oaks, and ash, as well as hawthorn, mulberry, sour gum, mountain-ash, and many others. In sunlit clearings, around huge boulders, and in filtered light under the canopy of trees, the flowering shrubs and herbs found their place. The fragrance of roses permeated the air, the strawberry-like *Waldsteinia* competed with cinquefoil for a spot in the sun. Smoke trees, spiraeas, snowberries, gooseberries, and vetches shared other niches best suited to their growth. Impenetrable thickets of climbing grapes *(Vitis)* and greenbriars *(Smilax)* sheltered and provided food for birds and smaller rodents.

High snow-capped peaks and buttresses of rock emerged from timberline and from the forest of pine and spruce below. Their melt-water rushed in torrents over boulders, formed misty waterfalls to swell the lower streams in deeper valleys. Here, higher humidity favored the growth of the Katsura tree *(Cercidiphyllum)*, the dawn-redwood *(Metasequoia)*, and cedars. From the varied wealth of fossil leaves, flowers, bracts, fruits, cones, and seeds we deduce a variety of ecological environments within the watershed of the ancient Ruby basin—not only moist and temperate, but arid and semi-desert as well. Dry segments of the gentler pediment and rocky slopes of higher elevations harbored grasses, penny-cress *(Thlaspi)*, mountain mahogany *(Cercocarpus)*, spiny mahonias, and the milfoil fern-bush *(Chamaebatia)*. Many members of this ancient flora have survived to this day in almost unaltered condition. Doubtless, the array of ancient species was much greater than fossil evidence may indicate, but their relative distance from streams reduced opportunities of leaf transportation to their final resting place in the lake. Such a typical basin flora is not unique. We find it, with modification, repeated a hundredfold in many of our western states.

Clearly, according to our fossil finds, we cannot postulate a mathematical formula for their interpretation. But acknowledging the validity of the old adage that "the present is a key to the past," we can certainly "approach" a true picture of the physical environment and can, with a little imagination, reconstruct attending meteorological phenomena.

Floristic evidence suggests that a temperate climate existed in "Ruby time," and hence seasons like today's merged imperceptibly, but spring and summer telescoped because of the higher elevations. We all view the seasons with different attitudes, expectations, and emotions, and thus my own "fossil" view of these periods of brief continuance may be at variance with the views of others. Milton, who doubtless spoke for the mild climate of England, characterizes spring as "the season prime for sweetest scents and airs." Some of this sentiment may be applied to the ancient Ruby spring as well, when the snows began to melt, freshets turned into roaring brooks, and the meadows burst into early bloom. Budding birches added a tender lacy green, and the willows swelled with golden bark. Unfortunately, evidence for color is lacking and must be left to the imagination. Birds, busy for their brood, pursued a host of insects, and they in turn received sustenance from flowers and fed on hapless prey. Meadows and forests in sultry summers welcomed inky clouds, the harbingers of frequent and violent thunderstorms which were a boon to ferns and redwoods in the deeper valleys. The insect fauna multiplied to fulfill its destiny in the balance of nature, and the flora that depended on these insects moved ever farther along the path of evolution into younger millenia and with a progressive refinement of mutual adaptation. In this geologically restless area, clouds of volcanic dust in the upper atmosphere caused brilliant sunsets which put those we admire today to shame. An incomparable evening glow settled over the lake, its mirror surface broken only by a hungry fish. When nights turned crisp in gradual transition and summer rains gave way to clearer skies, autumn entered the stage. Balmy days and freezing nights arrested the sap, and soon the landscape was clothed in a multitude of colors. Aspens in their golden tints dominated the scene, but maples, dogwood, sour gums, birches, beeches, oaks, and many others with purple, red, and orange enhanced nature's kaleidoscopic palette. Birds and rodents hunted for nuts and seeds and did not shun the red berries of the mountain-ash or the rose hips, which added a spicy hue to the gayety of fall. As colors faded and storms increased, leaves were blown into the slowing streams and carried to the silty bottom of the lake, their final destination. Late autumn rains turned into snow which deeply filled the valleys and covered all life under a protective blanket. The peaks glistened in their white splendor against the deep blue of the morning sky, and the greens of pines and spruces lent somber color to the range.

Observe always that everything is the result of a change, and get used to thinking that there is nothing nature loves so well as to change existing forms and to make new ones like them.

MARCUS AURELIUS,
Meditations IV

NEW ZEALAND REVISITED

By PIERRE DANSEREAU

Pierre Dansereau, who was previously Professor of Botany and Dean of the Faculty of Science at the University of Montreal, was appointed Assistant Director (Botany) and Senior Curator of The New York Botanical Garden on April 1, 1961. His first assignment was to New Zealand where he had been invited as a Prestige Scholar (Commonwealth Fellowship) by the University of New Zealand. His duties involved, besides lecturing, a great deal of field work and collecting. He kept a journal during his four months "Down Under" and extracts of this, together with a few selected pictures, are given here. Dr. Dansereau's peculiar way of dating his entries as well as his field notes and specimens has been retained. Thus 610405 means the 5th day of April, 1961.

I. MONTREAL — AUCKLAND

610405.—MONTREAL (P. Q.)—NAKINA (Ont.)

QUITE A SEND-OFF AT CENTRAL STATION: candies and flowers and kisses and tears almost. A feeling of things spent and done, a relief from pressures accumulated (renting house, selling car, writing notes, signing cheques. . .) as the Supercontinental glides out into the ugly suburbs, backsides of sooty houses. Montreal Island's grey grass and patchy black snow, trees torn limb from limb by the awful storm.

Our compartment, a "double bedroom," fairly roomy and cheerful with the lovely basket of flowers from the kids: pussy willow rigid and *Hebe* curving green among the spray of pink and red tulips, white chrysanthemums, and purple irises. And now to relax, read, and write as the night falls.

610406.—NAKINA (Ont.)—PORTAGE-LA-PRAIRIE (Manitoba).

A day in the boreal forest. Gone is the dense spruce and fir. Miles and miles of gently rolling granite and moraine, here thinly covered with leafless blueberry and bracken, there with rather tall (60') aspen, close-growing and healthy or with usually scattered and very yellow jack pine. In flat depressions, spruce bog (mostly Piceetum ericaceum). Nothing in bud or leaf. Dead of winter still. Towards Manitoba, more accidented landscape, curving lines, large rocky outcrops; bigger islets of spruce.

Good meals and service. A great amount of writing while this dreary landscape goes by. Few stops. Few signs of human presence beyond the sorry state of the natural vegetation.

610407.—PORTAGE-LA-PRAIRIE (Man.)—BLUE RIVER (B. C.)

As in '59, I awake to the sun-drenched spectacle of the aspen parkland near Watrous (Sask.). The lovely rich ploughed earth and the blond stubble of wheat neatly combed in rows. An ever-so-gentle long undulation with the medallions of aspen groves circumscribed in the slight hollows, with their suckers extending at the edge and creeping into harvested field or grazed prairie. Margin of brown *Symphoricarpos* and dead-straw grasses. Soggy depressions bright with orange- and yellow-barked dogwoods and willows.

And so through all of Saskatchewan and most of Alberta. Rich prairie landscape that leaves full scope to sky and clouds, long reiteration of combed black earth and pallid velvet grass, of bristling naked aspens and shrieking dogwood and willow. No birds. Almost no men. Ugly, ugly towns with their single-model grain elevator, their square houses, their muddy streets, their gleaming monstrous agricultural super-machinery chrome-yellow and minium-red. Saskatoon and Edmonton, thriving, growing very fast, not eliminating their waste.

Just before dark. The towering ghosts of the Rockies. Striated masses of burnt-amber rock, thinly studded with trees. As we rise onto the foothills: again aspen and spruce *(Picea albertiana)* and pine *(Pinus murrayana?)*, growing densely once more. The upper slopes have scattered *Picea* very low and strict or growing in small bunches. Many barren-looking lakes.

610408.—BLUE RIVER—VANCOUVER (B. C.)

When we awake, the Upper Fraser is before us, encased in steep rocky banks, its waters a glacial blue-gray. On nearby hillsides a long-leaved pine (can it be *Pinus ponderosa?*), and a great deal of *Picea (albertiana* or *engelmannii?)*. Presently it seems that *Pseudotsuga* is dominant, together with *Abies (amabilis? grandis?)* and scattered *Tsuga mertensiana.* Ample evidence of fire, some of it quite recent, much logging (arrested on banks of river). The shores of the Fraser (which becomes increasingly muddy) are very rocky or sometimes composed of crumbling rock and small boulders that have stabilized to the point of allowing a continuous covering of moss velvet. This is torn periodically by avalanches, rolling boulders, stream-carried logs, and other accidents. The poplars begin to flower, the birches to leaf.

At Boston Bar, the long-leaved pine is gone. Spruce and fir dominate. Grass is very green already.

Below Hope (or thereabouts) the landscape flattens, the Fraser widens, and large gravel flats ("platières," Gaspé style) are common. Settlement much denser. Some fruit trees. Relicts of the *Thuja plicata—Tsuga heterophylla* community. A red-flowering rosaceous bush. The most spectacular, in wet places, under the very open cedar: bright yellow spathes and the unfolding leaves of *Lysichiton camtchatkense.*

At Chilliwack, the broad valley floor. Flowering fruit trees, green lawns, and the beginning of the rather ugly B. C. towns. That temporary look of mere shelter.

Vancouver, reaching immensely into the landscape, but not climbing up very high. Sunny reflection on the broad glass surface of the new buildings. Wide streets. Freshness

One of the tree ferns of the northern forest of New Zealand, *Cyathea medullaris*. At upper left, a branch with the epiphyte *Collospermum hastatum*.

and newness. From our window in the Hotel Vancouver a lovely view of the sound, a broad valley closing the horizon, with snow-maculated slopes. Sound water clear and green except for repulsive floats (that will shine in the night): Texaco, Shell, B/A and a couple of others. None outdone. Why is it allowed? The Hotel Vancouver, typical Canadian Railway Hotel. Plush is the word. Plush is the symbol of the undying "stupide XIX^{e} siècle." Deep carpets. Studied silence. Marble, subdued lights. Depressed (and depressing) main dining room. Large windows dressed so as to admit no light. Slow and genteel service. Fortunately, very good food (except coffee): Pacific crab wonderful.

Violet and Ross MacKay (University of British Columbia geographer) call for us at five, take us through Stanley Park. How refreshing all this green lawn and daffodils after Montreal's grayness of late and lingering winter. *Thuja* trees magnificent, but many dead. Somehow more orderly, less mysterious than my 1932 memories. (My heart was young, but not gay as it is now?) Lookout over sound very grand. University of B. C. built up tremendously since 1949. Handsome buildings, especially Faculty Club which is truly original (by Laserre), reminiscent in some details of Ibadan (Fry and Drew's School?). We attend the banquet of the Vancouver section of the Canadian Association of Geographers. Dr. Jan Broek of Minnesota, guest lecturer on the "unity of geography," gives a very fine anti-doctrinaire speech well delivered (a bow to me en passant for the integration of biogeography). Morgan Thomas (Welshman who worked with Stanley Cain), my former Michigan student Robert L. Monahan are there, and Howard Critchfield, whom I had known in Christchurch in 1949. (All from Western Washington College, Bellingham, Wash.)

Tufts of the epiphyte *Collospermum hastatum (Liliaceae)*, showing the iris-like arrangement of the foliage. At left, leaves of *Schefflera digitata* and *Cyathea dealbata*.

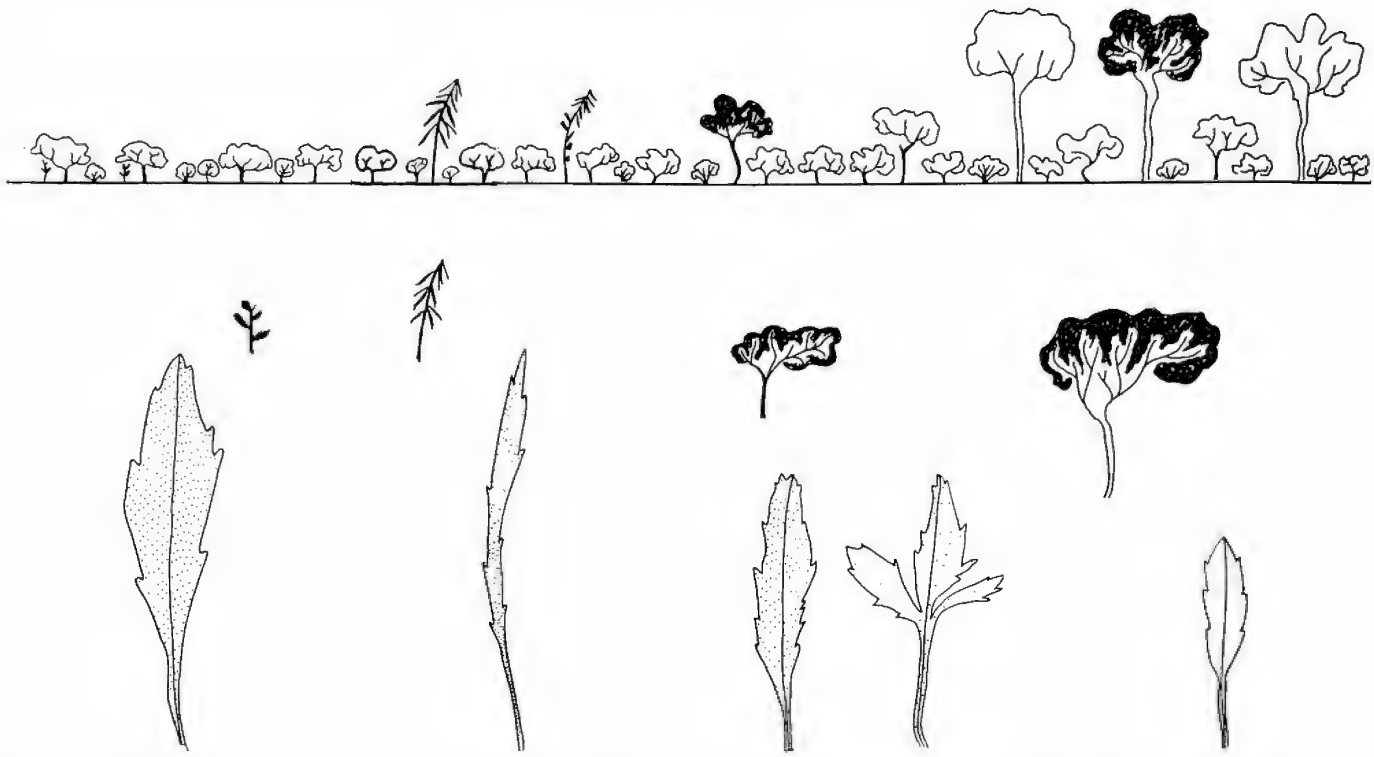
The edge of a broad-leaved–evergreen rainforest, showing the young tree fern *Cyathea dealbata*. At left, the liana *Freycinetia banksii (Pandanaceae)*. At right, the epiphytic orchid *Earina autumnalis*.

610409.—VANCOUVER (B. C.)—HONOLULU (Hawaii)

Bright morning sun on the water and the icy hills, the clean streets. Walk through deserted city to cathedral. A seedy young priest talks on marriage. Little inspiration, much reliance on authority. Comme chez nous. Breakfast in that dreary "main" dining room. Rhymes with gloom.

Airport small, noisy. We wait a long time. Very few passengers—only seven in Economy, none in First. Service excellent, food astonishingly good. Read Graham Greene's *A Burnt-out Case*. Can feel the Congolese heat and smell the jungle, also the Greenian sulfurous fumes. Another hour gained, forced ahead by the steady and deafening whir of propellers.

Honolulu. No astonishment before these jewels on the black velvet of the night anymore since I saw Pittsburgh so beautiful in 1952. This time, however, somewhat kaleidoscopic for we twist and turn a good deal before the landing. No suffocating breath of warm air when we emerge, only 69°F. We are duly bedecked with leis of frangipani. Drive to Hotel Waikikian seemingly along a broad avenue en-



The transformations of *Pseudopanax crassifolium (Araliaceae)*. The seedling (which normally germinates in a low, open scrub) has thin, nearly lobate leaves. The sapling grows to several meters without branching and has very long, coriaceous leaves. The young tree (usually amid denser scrub) is branched and has thinner (and sometimes lobate) leaves. The round-headed adult (in tall scrub or forest) has smaller, membranaceous leaves.

The juvenile, unbranched form of *Pseudopanax crassifolium* with long, coriaceous, deflexed leaves.

The abundantly branched adult form of *Pseudopanax crassifolium* with the shorter, more membranaceous leaves

A view of the city of Dunedin from the slopes of Mt. Cargill. In foreground, cabbage tree *(Cordyline australis);* on hills, pasture with forest remnants and manuka scrub *(Leptospermum scoparium).*

Scrub on Mt. Cargill: *Dracophyllum longifolium, Coprosma propinqua, Cassinia fulvida, Neopanax colensoi.* Otago harbour in background.

tirely lined with garages and filling stations.

Room at hotel delightful. "Background" music all over grounds, emerging from coconut and philodendron. (Are you listening, Evelyn Waugh?) Hawaii, backward and forward. But no matter, good shower, fresh sheets, and that teasing Hawaiian breeze. We walk to a restaurant: I must have papaya. The people around us: some very lovely girls of mixed bloods, some curiously assorted couples. But the dress! The exhibited bulges, the dyes, the outfits! Man and woman wearing identical beflowered fabric. Such skinny, hairy knees, such sagging buttocks, such breasts beyond hope! Et le clou: the muumuu (eh bien oui), a new version of the Mother-Hubbard which is worn by women of all ages, actual and assumed. Looks like a nightgown, flows on all sides, rests on all angles, masks a variety of uncertainties, upwind and downwind.

610410.—HONOLULU

A day in this fair city. Could one escape the artifice? convince oneself that real people live here? that all is not make-believe? Breakfast face à la mer, under coconut trees, served by partly Hawaiian, partly Brooklyn girls in sarongs, crowned with wreaths of frangipani, but unsmiling and disgusted with their menial task (Espagne! cruelle Espagne, où es-tu?). Again papaya. Also Portuguese sausage, taro. Toutes les spécialités. And cold coffee.

Visit super-shopping center (or shopping-super-center?) whence we are driven to the Bishop Museum and I can assure myself that some people work for a living. Brenda Bishop, as charming and efficient as ever. We discuss bigness of Congresses. To Alex Spoehr I recount my failure to have the IX International Botanical Congress anatomized and psycho-analyzed by social scientists. I still think it was a good idea. The Museum has progressed tremendously, many improvements since 1953. Intelligent and picturesque exhibits in entomology and malacology. Large fresco of Polynesian migrations well commented. No botany.

Rather lazy afternoon. Swim in too-warm water. Long wait again at airport. Only six passengers.

610411.—(SKIPPED AT DATE-LINE)

610412.—Over the PACIFIC to FIJI and AUCKLAND

The long night from Honolulu to Nandi. Very smooth. Clouds, black sea, bright stars. We can all use three seats as a bed. Two more hours lost. Again excellent food. Good reading. Long slumber. I awake among the stars, almost to be reached. A feeling of unreality bred of the long train drone, the twisting Rocky Mountain curves, ice-on-the-mountain, and the sharp lift and the vibration of the plane in the blue. Hours lost like leaves, like limbs almost, and without pain but with a feeling of numbness. Where am I? and who? and who cares why anymore? Out of this breaks the cold rose of dawn, under the black wings of death in the air, death in the fall. The angry glow spreads across the sky but not down on the hard glass of the sea. The hopeful whir of propellers on this day. "La naissance du monde," says Françoise, when we see the first of the Fiji Islands, sprawled like a dead spider, warty, very black on the hard sea, against the greening sky.

At Nandi, a good breakfast served by gentle, deferent, and handsome Melanesians, softly treading barefoot. And then the last stretch. Weary now. And dazed. Is this really morning? did we just have breakfast? Or is it not already time to sleep again? But no, the sun is high. It is seven hours earlier in Montreal, and the greenness of New Zealand shines between our wings. We dip down through bumpy cloud belts. This is Auckland.

II. AUCKLAND — DUNEDIN

610412 (continued).—AUCKLAND

This is known territory: the neat checkerboard of green and black and the lacework of the bays that strangle the Auckland area. Joy of returning after twelve years. V. J. Chapman welcomes us at Whenuapai Airport, and we drive along highway bordered with Monterey cypress and pine *(Cupressus macrocarpa, Pinus radiata).*

But Auckland itself has changed. Used to be a "far-western" town of clapboard houses. Still has the Victorian

stamp, to be sure, but the women without coiffures are replaced by very stylish girls, the sloppy men by tweedy and more dashing types. And of all things, "café espresso" is to be had in hole-in-the-wall shops and cellars done up in stilted Scandinavian furniture. Used to be nothing to drink or eat between meal hours; now tasty bits and good coffee (tea is passé, I am told!). At the hotel, excellent Crayfish Newburgh! I shall have to revise my judgment of New Zealand cuisine?

610413.—

J. A. McPherson, Director of Parks, takes us on a tour to the Waitakere Range. Through suburban Auckland, many new, cheap but bright and beflowered homes. Well-kept gardens, and beautiful, vigorous children. They go barefoot to school, not because they cannot afford shoes!

The remembered Monterey pine plantations invaded by tree ferns *(Cyathea dealbata)* and bordered by pampas grass *(Gynerium argenteum* or better: *Cortaderia selloana).* It seems to me that this plant has spread considerably. Mr. McPherson says it has.*

The Cascades Park has a fine promenade bordering a brook, where we see the big-leaved, dark green laurel *(Beilschmiedia tarairi),* an extraordinary abundance of tall tree ferns *(Cyathea medullaris, C. dealbata),* and the only native palm *(Rhopalostylis sapida)* with its constricted inverted cone of rigid leaves that do not fan out. The famous kauri *(Agathis australis)* forms rather large populations on the escarpments and ridges where it gets more light than on the flatter plateaus where its regeneration is not assured.** The big trees are impressive, with their elephant-skin fat trunks that do not visibly taper below the first branches and then send out awkward twisting limbs with tufts of rigid leaves on their tips. A contrast with the elegance of rimu *(Dacrydium cupressinum)* which rises in a symphonic movement, its lycopod-like branchlets drooping in cataracts of dark green. The totara *(Podocarpus totara),* on the other hand, is a compact mass of closely knit foliage.

610414.—RANGITOTO ISLAND

Chapman and his colleague J. M. A. Brown take me out to Rangitoto Island, a classic botanizing ground. Entirely volcanic, very rough scoriac surface. But high rainfall allows much investment by vegetation. A *Metrosideros* forest, mostly pohutukawa *(M. excelsa),* 8-10 m. high,*** a cindery green, rather irregular and open. Bright yellow-green clumps of *Griselinia lucida,* fleshy-leaved like *Clusia.* But above all the furry silver of *Stereocaulon* on all faces of the rock and the stiff sword clusters of *Astelia* and *Collospermum* on the ground. The latter almost an obligate epiphyte elsewhere. Some ericoid plants (not *Ericaceae*): *Cyathodes, Leptospermum, Hebe.* And the delicate unfurling of translucent fronds *(Asplenium, Cardiomanes, Hymenophyllum).*

Shoreline of polished porous lava, quite sterile, above a belt of clustered sharp-edged white oysters that crack crisply underfoot.

610415.—AUCKLAND to DUNEDIN

Our last flight for a good long while, thank goodness. Small wadding-clouds cling to Waitakere Range. But over Tongariro the air is clear, and the black softly smoking volcanic mouth of Ngauruhoe is encased in bright snow which streaks down to the dull pink pumice on the plateau below.

Cook Strait air is turbulent on landing at Wellington and on take-off towards the South Island. High wall of the southern Alps purple-gray, with snow streaks. Much quieter over the Canterbury Plain, green and brown, cut through by silver-braided expansive water-courses.

Circle above Dunedin at last, our destination. Suburbs of very new-looking pink and red roofs. Flow of dimmer-looking houses down to the harbour encased between the green and fawn hills. The inlet, a punch into the heart of town.

At the small, unpretentious airport, our good friend Geoff Baylis, with a bright blue-eyed smile. And we are rocked up and down many hills before reaching the apartment that the university has offered us, a roomy, well-furnished, well-lighted home surrounded by campus and museum on all sides. And we make our first cup of tea!

(To be continued)

*J. Dawson (Tuatara, 7(1):1-6. 1958) says that it hybridizes with the native **Arundo conspicua.** And therefore, should not the New Zealand grass be transferred to **Cortaderia?**

**R. V. Mirams (Trans. Roy. Soc. N. Z., 84(4):661-680. 1957) has studied the regeneration of kauri and concludes to a cyclic alternation with broad-leaved dicotyledonous species.

***R. C. Cooper (Rec. Auckl. Inst. Mus., 4(4):205-212. 1954) has shown hybridization and introgression in **Metrosideros excelsa** and **M. robusta** on Rangitoto Island.

WALTER ALBERTO EGLER 1924-1961

By BASSETT MAGUIRE

Dr. Maguire is Head Curator, Nathaniel Lord Britton Distinguished Senior Curator, and Coordinator of Tropical Botany of The New York Botanical Garden.

WALTER EGLER, at the age of thirty-six, lost his life on August 28, 1961, in the Cachoeira Macacoara of the Rio Jarí, tragically closing a brief but productive span of ten years as a practicing field botanist.

The accident occurred on a botanical expedition in the upper reachers of the Rio Jarí, which forms the boundary between the Territories of Amapá and of Rio Branco, both of Brazil, north of the Amazon. The Jarí is a large river by North American standards and is interrupted by numerous rapids and waterfalls over which the travelers had to pass their boats or to carry by portage boats, equipment, and supplies around them. It was above such a falls, the forty-five-foot Cachoeira Macacoara, that the tragic accident occurred.

Dr. Howard Irwin, co-leader of the expedition, in the first of the two motor-powered boats, with his crew and gear, had in normal procedure cleared away from the landing and gained way beyond the strong currents that drove towards the falls. Dr. Egler, in the second boat with a crew of five men, cleared the landing, but once in the full force of the stream the motor and other means of checking the backward movement of the boat failed. In

(Continued on page 29)

A thick fall of snow, the best winter covering.

GARDENING WITH GRANITE IN THE NORTH

By CLARENCE L. HAY

Mr. Hay is Research Associate in the Department of Anthropology of the American Museum of Natural History. He served as Secretary of the Board of Trustees of the Museum from January 1931 until October 25, 1954. On that same date he was elected as Honorary Trustee, having been a trustee from February 1924. Mr. Hay has long been active in the affairs of the Horticultural Society of New York, in which he held the office of Secretary for a number of years and is now Vice President and a member of the Board of Directors. He has also been a member of the American Rock Garden Society since its organization in March 1934.

THIS IS ABOUT A ROCK GARDEN on Lake Sunapee, in the foothills of the White Mountains, where the winter temperatures sometimes drop to thirty-five or even forty degrees below zero. A long season of snow is a godsend to the plants; but with months of bare frozen ground, they are distinctly out of luck. There have been many failures, but some surprising successes.

The title, "Gardening with Granite," is an exact description of the facts. From the beginning, except in the rock garden where we utilized the existing ledges and boulders, digging was done more with dynamite than with the spade.

In 1916 we built a high granite wall to the south of the low rambling house. Inset in a niche was a huge concrete urn that formed a fountain. The water, which had been diverted from a mountain stream, splashed into a basin, was then carried underground, and spilled out on a steep hillside towards the lake.

The part near the fountain was enclosed with a low wall and was planted to roses. This is the special province of my wife, who is a rose expert.

It was not until many years later that we started the rock garden. We constructed it below the rose garden in a most unorthodox manner, working down from the top, year by year, and section by section.

The spill on the hillside was converted into a little brook, paved and bordered with weathered stones. In those halcyon days we made the rock garden too extensive, and later it was too expensive to handle, so we planted much of it to shrubs and small trees, concentrating on the main path beside the brook.

Well over half a century ago, when I first thought of making a garden of alpines, I was told it was quite simple. All you had to do was to put in your plants, let them spread, and they would crowd out all the weeds. No more erroneous concept was ever advanced.

Perhaps, besides the grasses, the two worst offenders are sorrel and white clover. The latter forms an underground mat that has to be dug up to save one's valued pets from strangulation; and of the former, if you leave one slender white root, it will beget more sorrel.

I am quite fond, however, of some unobtrusive weeds such as the maiden pink *(Dianthus deltoides)* and the ubiquitous harebell *(Campanula rotundifolia)*. These appear everywhere, but they are always well behaved and do not try to crowd out other plants. Also, the native *Aster linariifolius,* which spreads rapidly, is neat, blooms in September, and is useful to take over ground which if neglected would

Upper. The rose garden fountain. *Hydrangea petiolaris* on the wall.
Lower. The rose beds in summer.

Above. The rock garden, looking north.
Left. A corner of the lily pond with a fine beauty-bush, *Kolkwitzia amabilis*, above it.

become a wilderness of grasses, goldenrod, and milkweed. But beware of introducing certain sedums, such as *S. sarmentosum*, or *Lysimachia nummularia*, alias creeping Charlie or Jenny or moneywort, and ferns of any size except maidenhair *(Adiantum pedatum)* and one or two others. Giants like some of the osmundas establish such powerful roots that it takes almost a bulldozer to remove them. Fern enthusiasts usually fail to remind us that most ferns turn brown in late summer and have to be cut down.

In addition to the usual enemies, such as insects and fungi, against which we must spray, we have acquired, gratis, a personal zoo: woodchucks, chipmunks, two kinds of outdoor mice, moles, and, to a limited extent, rabbits. Porcupines scorn the alpines and concentrate on trees, preferably elms and apples. Coons seem to prefer pears.

Of nocturnal visitors we have a plenty—skunks, coons, and possibly foxes. On many an August morning the well-kept lawns present a sad sight. Every few feet there is a hole made by one of our guests during the night, seeking grubs, and, like the inconsiderate golfer, they neglect to replace the divots. If we wish to continue to occupy the premises, the skunks have to be lured into a box trap, definitely not an open steel one.

Chipmunk holes are everywhere, and these rodents have a predilection for the blooms and tender stems of the rarest alpines. They work on the doormats, and though these provide no nourishment, presumably the coco fiber is used as decor in their subterranean homes.

In paper containers, we set out a poison which is supposed to cause hemophilia, the bleeding disease that afflicted some royal families of Europe. This is now the chipmunks' favorite food. They not only eat the contents, but avidly chew up the containers as well. The method seems to be effective, as their numbers had diminished considerably at the end of August. I aided with a 22-caliber rifle.

As for deer, yew is their favorite delicacy. They are not choosy, as long as it is *Taxus*, whether of gardens or the wild *T. canadensis* abounding in our woods. Deer are efficient pruners, but not the topiary experts one would select to trim the greenery. They have an aversion to the odor of blood, and applying dried blood to the surface of the ground (it is an excellent plant food) and hanging it in balls, like Christmas tree decorations, on the branches are reasonably successful repellents.

To our great regret, we no longer have dogs. They would obviate all these precautions.

In the good old horse-and-buggy days, when even the pedestrian got a break on the highways, we built the rock garden. There was then an abundance of labor, mostly Italians who were content to command about the same daily wage that an unskilled workman today gets per hour —and they enjoyed their job.

Great flat stones were dragged down on a "stoneboat" by four-legged horse-power from a bald-topped hill a mile away, to make the steps and the edges of the lily pond. The largest slab measures fifty-seven inches by thirty-nine inches and is over six inches thick. How did we ever get all these down from the hill and put into place? Today it seems incredible.

I have a card index of about four hundred different kinds of alpine and woodland plants. Many, such as the twinflower *(Linnaea borealis* var. *americana)*, goldthread *(Coptis)*, partridge-berry *(Mitchella repens)*, snowberry *(Chio-*

genes hispidula), checkerberry or wintergreen *(Gaultheria procumbens),* and bunchberry *(Cornus canadensis),* were transplanted from our woods. There were importations from faraway places, sino-ornata gentians from England, galax and shortia from the Great Smokies, columbines from the Rockies, and a goodly number from as far west as Oregon and Washington.

In spite of all the climatic and topographic differences, many of these have persisted to this day and have increased; however, when weeding I keep coming on tiny lead tombstones, marking the final resting place of the departed, and I still find the cards useful for reference. The first date on my index is 1926, when we began to cover the prepared ground.

We have every condition of sun and shade on the slopes, which first face south; then beyond the lily pond the path takes an abrupt turn to the west, bordering the brook. At this point there is a four-foot waterfall flanked by maidenhair ferns, which are indigenous. Here also is a thorn tree that affords partial shade to a slope covered with multicolored polyanthus primroses.

From here the brook meanders between mossy banks, which are blanketed with ferns and moisture-loving plants, until it comes to the lower big pool. This is mysteriously dark, shaded by a crab tree, evergreens, and some tall specimens of *Azalea arborescens.* It is a frog's paradise.

Then a miniature cataract drops into a ferned pool, much smaller and even darker, and the stream passes by a mass of the willow gentian *(Gentiana asclepiadea)* and disappears in the woods at the bottom. No cement has been used except in the lily pond. This is distressful in times of drought, but it gives a natural effect which otherwise could not have been attained. Unlike Tennyson's brook, it peters out and does not go on forever.

The best compliment we ever had was from a lady visitor who exclaimed, "Weren't you lucky to have a brook running right through the rock garden!" To balance this, an eight-gardener dowager remarked, after looking things over, "What a beautiful toy."

Short of writing a book, it would be impossible to record the desirables and the discards. But there is one tiny plant that deserves mention, the mountain cranberry, native on Mt. Washington. It is saddled with the topheavy name of *Vaccinium vitis-idaea* var. *minus.* It is evergreen and

A willow gentian, *Gentiana asclepiadea,* in August.

has edible red berries. Without becoming a nuisance, this spreads everywhere, in sun and shade, in moss and even under low junipers.

Since gentians are among the most beautiful of all flowers and among the most difficult, I was mulish enough to attempt to grow them. I have thirty-three cards on gentians alone, the great majority of which are but memories. However, some varieties have survived and are worth all the effort.

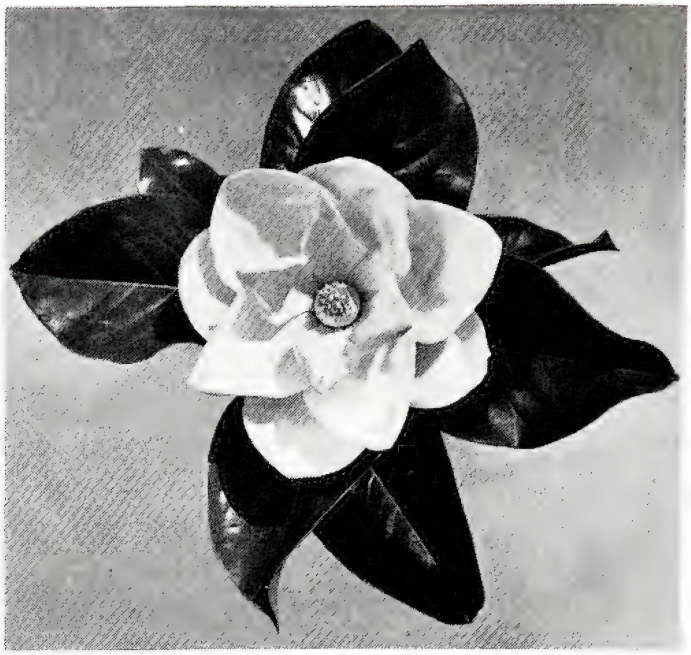
In 1935 Montague Free gave me two plants of the willow gentian, which at once made themselves at home. This gentian is rather tall for a small rock garden, but is invaluable in ours, flowering in August when there is little in bloom except heather and members of the Onion Family. It likes moisture at the roots, but does not insist on wet feet. From that modest beginning we now have hundreds, self-sown. The two original specimens were blue, but about half of their descendants are a pure ivory-white.

And now, a few hints from an old-timer to beginners who are planning a rockery or an alpine garden. If possible, select a slope. If the site is on level ground, it is best to take Punch's classic advice to those about to get married---don't; don't try to create a rock garden. But if you feel you must, don't construct a mound resembling a

(Continued on page 28)

At the top of the rock garden in spring, with a background of lilacs and flowering crabs.

The rock garden in summer, still a mass of blooms.



Above. A flower of *Magnolia grandiflora* 'Samuel Sommer'. The twelve petals are in three tiers of four. The surface of the leaves is unusually glossy.

Left. This five-year-old specimen of *Magnolia grandiflora* 'Samuel Sommer' was eight feet tall when planted from a fifteen-gallon tub in April, 1960, to the garden of Mr. and Mrs. Maunsell Van Rensselaer, Saratoga, California; is now, October, 1961, thirteen feet tall. It flowered profusely the last four years.

THE SARATOGA HORTICULTURAL FOUNDATION

By ELIZABETH McCLINTOCK

Dr. McClintock is Associate Curator in the Department of Botany, California Academy of Sciences, San Francisco.

DURING THE PAST FEW YEARS the need has been realized for planned planting of trees and shrubs around homes and along streets of newly developed urban communities. In order to maintain a harmonious balance between the dwellings and their surroundings, the right tree or shrub for a particular setting is of utmost importance. Landscape architects and contractors, city planners, and park executives now specify what they want of the trees and shrubs as to habit, ultimate size, and eventual growth in a particular site. The stumbling block to such planning is the lack of information on the performance of even well-known trees and shrubs. This is chiefly because selection of woody ornamentals for this use has lagged behind selection of crop and other economic plants. Since performance of trees and shrubs grown from seeds is usually variable and unpredictable, the need was apparent for an experiment station where selection, testing, and propagation of woody ornamentals could be carried out.

In 1951 the Saratoga Horticultural Foundation was founded by Maunsell Van Rensselaer and Raymond D. Hartman as a place where work of this kind could be done. Mr. Van Rensselaer, Director of the Foundation since its beginning, has selected a large number of trees and shrubs for testing and possible use. Methods of propagating these vegetatively in large numbers by the most efficient techniques have been worked out. New plants are constantly being looked for, since not every plant selected is put into production, and often a plant that has been used will be discarded because a better one has been found to replace it. These plants, which we like to call pedigreed because their performance can be predicted, are sold wholesale to growers and to commercial nurseries and eventually reach home gardens and city streets.

The Foundation occupies six acres of land near Saratoga in the Santa Clara Valley. Here are to be seen blocks of the selected trees and shrubs in all stages of growth. Each block bears an identifying label. On the grounds there are several lath-houses and greenhouses, and in one place a test plot where individual plants are set out for observation. The Foundation is a non-profit corporation supported largely by the sale of the young plants that it produces. During the ten years of its existence the Foundation has gained a position of authority and eminence among nurserymen, landscape architects, and city park executives, and

has the endorsement of the National Shade Tree Conference and the American Association of Nurserymen.

The position of the Foundation in California horticulture is unique on the Pacific Coast, since nowhere else in the region is work of this kind carried out. Its work can best be described by discussing some of its tree and shrub selections and the success they have had. Among the tree introductions the two most successful, widely distributed throughout the United States, have been *Ginkgo biloba* 'Autumn Gold' and *Liquidambar styraciflua* 'Palo Alto'. Both of these are deciduous trees with colorful autumn foliage, and in California where the number of trees with fall color is limited, these have been very popular.

Ginkgo biloba, the maidenhair tree, has the desirable qualities of adaptability to a wide range of climatic and soil conditions, disease-resistance, and golden foliage in the fall. These qualities can be used to best advantage by selecting mature specimens known to be male trees of a good habit, and propagating these vegetatively. The use of male trees eliminates the undesirable fleshy "fruits" (seeds) of female trees. The Foundation has made twelve such selections from specimens in various parts of the United States and Europe. Not all these selections have been used, but the successful ones have added to the popularity and usefulness of this interesting tree. Sometimes called a "living fossil," because it is not known to exist in the wild today, the maidenhair tree was cultivated for centuries as an ornamental in temple grounds in China and Japan. Had it not been for the priests in these temple grounds, we would not have this tree today.

Liquidambar styraciflua, the American sweet gum, is a tree of the deciduous forests of eastern North America. In the wild it varies greatly in habit, size, shape, and color of the foliage. The clone 'Palo Alto' was developed by the Foundation from a tree in which the leaves turned simultaneously in the fall to a bright orange-red color. In the Foundation's test plot it is interesting to note the uniformity of this character in young trees of 'Palo Alto' contrasted with the seedling trees growing in adjacent plots.

Magnolia grandiflora is another species that the Foundation has grown in large quantity for selection, testing, propagating, and eventual distribution. This evergreen from the coastal plain of the southeastern United States is valued for its spreading habit, large glossy leaves, and large white flowers. In the wild, trees differ in the shape of the leaves and the amount of brown hairy indumentum on their lower surfaces, in the size and shape of the flowers, and in the duration of the flowering period. It has been grown as an ornamental in this country and in Europe for many years, and a number of cultivated forms are known. The value of selected trees of *Magnolia grandiflora* has been recognized in recent years. Of those in California,

Left. The parent tree of *Ginkgo biloba* 'Autumn Gold'. Note ascending branches and oval, upright ascending crown.

Right. Seven-year-old specimen of *Ginkgo biloba* 'Autumn Gold' in restricted planting area on city street.

Upper left. *Garrya elliptica* 'James Roof', an eight-year-old plant grown from a cutting, with tassels eight to twelve inches long.

Upper right. *Arctostophylos densiflora* 'Howard McMinn'.

Below. *Geijera parviflora* in the test plot at the Saratoga Horticultural Foundation.

the best-known is the clone 'St. Mary', a selection made by the Glen St. Mary Nurseries in Glen St. Mary, Florida, over forty years ago.

During the past several years the Foundation has grown thousands of seedlings of *Magnolia grandiflora* (as many as seven thousand in one year) from seeds obtained from local trees and from collectors in the southeastern states. The variation in these seedlings in the above-mentioned characteristics was noted, and certain trees with desirable characteristics were selected. These were grafted on seedling trees of this species, since it was found that grafted magnolias have the desirable character of flowering in the first or second year.

Two early selections of *Magnolia grandiflora* made at the Foundation were the clones 'Stalwart' and 'Margarita'. The parent plants of both showed desirable characteristics. The parent of 'Stalwart' is a mature tree of nearly forty years with a dense crown. It flowers freely, is forty-nine feet tall, has a branch spread of twenty-six feet at the base tapering slightly to the summit, and has attractive pink sheaths on the slender leaf-buds. 'Stalwart' was recommended for streetside planting and was so used for nine years. The parent tree of 'Margarita', nearly twenty-five years old, and twenty feet tall with a comparable spread, showed promise at the time the selection was made. In the meantime, however, other selections appear to have superior characteristics, and production of both of these selections has been discontinued. This indicates the great care the Foundation uses in making its selections.

A more recent and more promising selection, which originated as a chance seedling, is the clone 'Samuel Sommer'. This has a sturdy upright growth-habit, exceptionally large leaves with a very high gloss, strongly marked veins on the upper surfaces, and a prominent and very attractive rusty brown hairy indumentum on the lower surfaces. Its flowers are as much as fourteen inches across with twelve petals in three tiers of four each. The characteristics of this clone were so different from and superior to all other

selections of this species that a patent was applied for and ultimately allowed (Plant Patent No. 2015). An unnamed clone, still in the testing stage, has smaller leaves with an even more prominent rusty indumentum than that of 'Samuel Sommer'. It also originated as a chance seedling.

The Foundation is growing selections of several species of trees unknown or little grown in California. These will become better-known as they are distributed.

Rhus lancea is a narrow-leaved evergreen tree with graceful pendent branches. It was introduced to this country in 1913 from dry regions of South Africa by the late Dr. H. L. Shantz of the former Bureau of Plant Industry of the United States Department of Agriculture. Though extensively used in Arizona, it is still almost unknown in California. It is a member of the Sumac Family and a relative of *Schinus molle,* the California pepper tree, which it superficially resembles.

Geijera parviflora, the Australian willow, is a narrow-leaved evergreen with a willow-like habit. It comes from dry regions of Queensland and New South Wales in Australia. Like *Rhus lancea* this tree is almost unknown in California. There are two specimens growing at the Citrus Experiment Station in Riverside, California, that were planted as seedlings in May, 1921; these date from a 1920 introduction by the United States Department of Agriculture. They have thrived well—one is slightly more than thirty feet tall—and bear viable seed. This seed has been the source of the Foundation's stock of young trees now being distributed. As with *Rhus lancea,* there has not been any selection with this tree. *Geijera* is a member of the Citrus Family and has small white flowers resembling those of the orange.

A selected form of *Cornus nuttallii,* the western dogwood, has been made from an isolated plant growing among madrones and redwoods in the Santa Cruz Mountains of California. Dogwood trees in these mountains represent the southernmost stand of this species in the Coast Ranges, and it seemed probable that a selection from this stand would be more successful in California than would plants from the more northern parts of the range of the species. Cions were taken from a tree in the wild and grafted on stock of *Cornus capitata,* a Chinese species, which is known to be resistant to heat and drought. Since the roots of the trees in the Santa Cruz Mountains were growing in the shade of madrone and redwood, it was thought that a grafted rootstock would be more successful. The clone, called 'Pilgrim', is being distributed although plants are still young. One plant, five to six years old, is about six feet tall and had about fifty flower-heads last spring. This shows promise of being useful for California.

Pistacia chinensis, Chinese pistache, is a relative of *Pistacia vera* of the Mediterranean region from which the commercial edible pistachio nut is obtained. The Chinese pistache is a deciduous tree that has very vividly colored foliage in the fall. It is dioecious, that is, there are male and female trees, and usually the male trees are the more shapely and colorful. It is resistant to both heat and drought and so is useful in the interior parts of California. Several years ago a tree with vivid autumn color was noted in the community of Los Altos from a vantage point on the Skyline Boulevard on the crest of the mountains above, a distance of some ten miles. Upon examination the tree proved to be a male, with a uniform branch structure, and a vigorous plant. It was propagated by budding on second- or third-year seedling stock. The resulting clone, not as yet named, is so far the most promising selection of this spe-

Growing grounds of the Saratoga Horticultural Foundation, with the Santa Cruz Mountains as a backdrop.

cies. The original parent tree, incidentally, was recently destroyed by a bulldozer.

Ceratonia siliqua, the carob tree, is a spreading evergreen which attains a height of forty or fifty feet. It belongs to the Legume Family and has large pods rich in protein and sugar; in the Mediterranean region, where it is native, it has been cultivated for centuries as food for cattle and horses and also for human food in times of crop shortage (whence its name of St. John's bread). As a street tree, however, the pods are objectionable, but by the selection of a male tree (the species is sometimes dioecious) with a desirable shape and size and with resistance to cold and drought, a clone that will be fruitless and suitable for hot dry areas is now being propagated for distribution.

Rhamnus alaternus, the European buckthorn, is an evergreen shrub or small tree with very small flowers and small black fleshy fruits, related to and somewhat resembling species of the genus that are native in western North America. An unnamed clone is being developed from a parent tree about thirty feet tall and of vigorous upright habit. Thus far the progeny displays uniformity of habit very suggestive of the parent tree.

Dodonaea viscosa, a small evergreen tree with purple lanceolate leaves, was established as a clone and is being grown on standards for uniformity of foliage color. This is not new but is of interest because of its use in pilot streetside plantings in Claremont and other communities in California.

Sapium sebiferum, the Chinese tallow tree, is a small evergreen with poplar-like leaves that turn red as they age. This is very useful for warm valleys of the interior part of California, but not so useful for coastal areas.

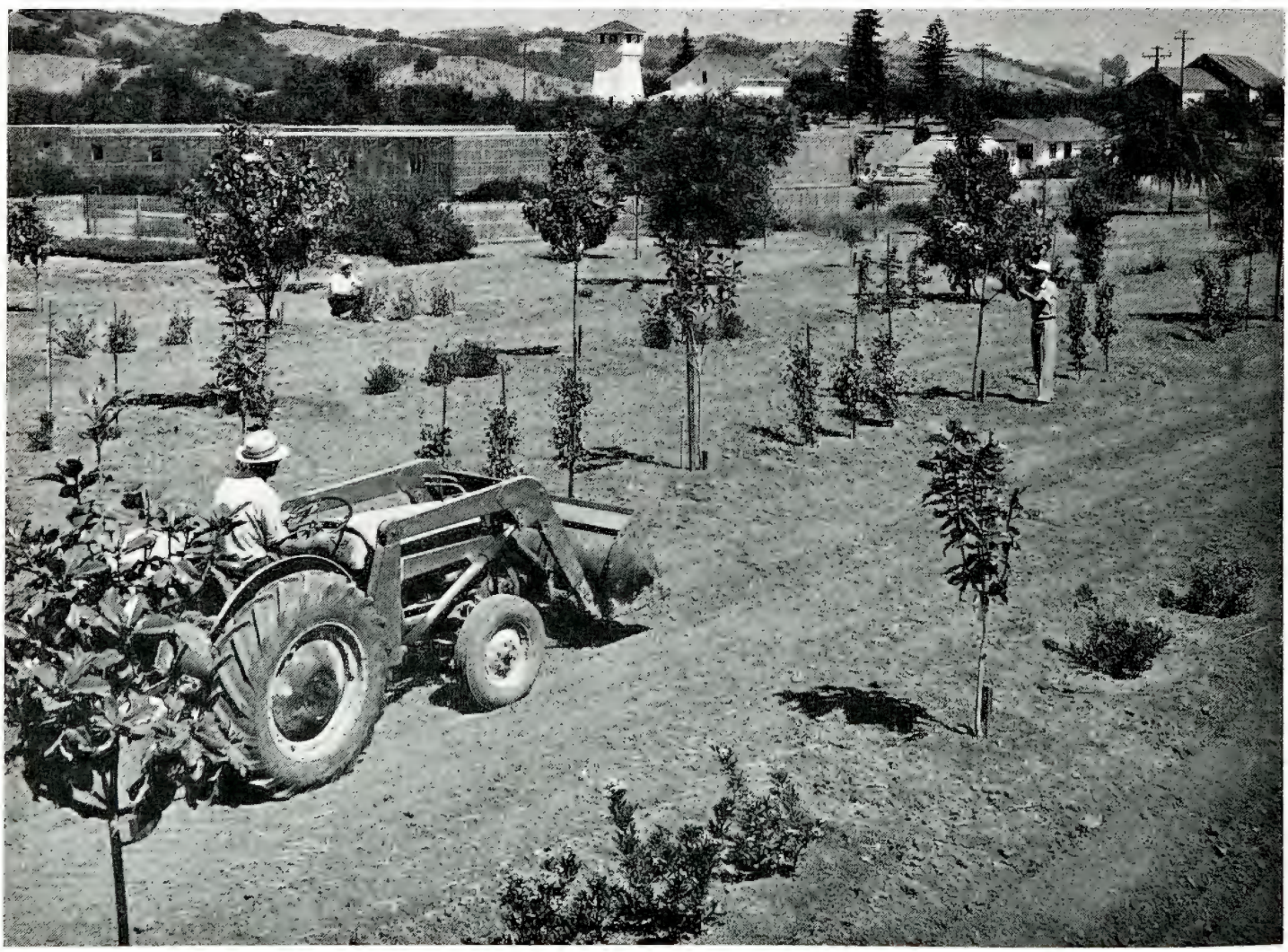
A fastigiate or columnar form of *Koelreuteria paniculata,* imported to California by the Foundation from the Royal Botanic Gardens at Kew in England, is now available as a clone.

Tristania laurina, an evergreen tree of the Myrtle Family, native to Australia, has an erect habit and small yellow flowers. A tree in the Strybing Arboretum, Golden Gate Park, San Francisco, was the parent for the trees now being distributed as clonal specimens by the Foundation. This is being tested in pilot streetside plantings in southern California cities under the University of California (Davis) Performance Evaluation of Landscape Trees. *Geijera parviflora* is another tree that will be so evaluated.

The Foundation's selective work with shrubs has emphasized chiefly the best growth-forms of several native California species of *Arctostaphylos, Ceanothus, Garrya,* and *Rhamnus.* Of its shrub introductions the most suc-

(Continued on page 29)

Selections of *Magnolia grandiflora* may be seen in the foreground of the test grounds of The Saratoga Horticultural Foundation.



EXOTIC WEEDS UNDER GLASS

By MARJORIE WIHTOL

Marjorie (Mrs. Karl) Wihtol successfully grows a great variety of plants in her garden and greenhouse in Middletown, New Jersey, many of which she has collected during her travels to foreign countries. Mrs. Wihtol has contributed to *The Cactus and Succulent Journal* and other publications.

L. H. PAMMEL IN *Weeds of the Farm and Garden* cites a weed as a "plant out of place," and this is the definition to keep in mind while reading this piece, rather than such dictionary indignities as "useless," and "unsightly." To translate Lucretius' quip from the dinner table to the garden, one man's orchid may well be another's crab-grass, and similarly according to Liberty Hyde Bailey: "Datura behind the barn is Jimson-weed: in the lab it's stramonium." Some years ago in the village of Fortin in Mexico, three United States pennies purchased a garland of orchids, and the surface of the hotel swimming pool was a white blanket of gardenia blossoms, changed daily. I received the impression that this was a pretty functional method of local weed disposal as long as the "crazy" tourists were willing to put up with it. Meanwhile, back on Fifth Avenue . . .

A greenhouse, like the perennial border, the onion patch, and even The New York Botanical Garden, has its characteristic weeds, and, contrary to dictionary definitions, many of them are useful and sightly. Though the compost may be sterilized or even purchased in order to impede the arrival of the unwanted, certain introduced plants will start getting around on their own, one way or another, and so become, by the above preferred definition, weeds.

The bryophyllums, listed sometimes under *Bryophyllum,* usually under *Kalanchoë,* are the most ingenious of population-exploders; they drop their young liberally from the edges and tips of their leaves. They are held in abhorrence by commercial growers, treated with contempt by serious collectors of succulents, adored by children who carry home a leaf to pin to a window-curtain and watch the plantlets grow (and so, presumably, develop Linnaean leanings themselves), and are accepted gratefully for sale by churches, dime-stores, and supermarkets. In our greenhouse there is always a small grove of the stunning, dramatic African species which, to the surprise of many, bloom most handsomely—and further do it at Christmas. Furthermore, while in full bloom they can be pulled out by the roots and shoved into any container with or without soil, and they will fulfill their colorful destinities with as much aplomb as though they'd never been touched. A weed indeed!

Plectranthus australis blooms on a piece of wood.

Cyanotis veldthoutiana drapes itself along the edge of a greenhouse bench.

It is my opinion that a hobby greenhouse should not be a calendar-controlled and sterile laboratory with manicured, wired-up rows of carnations that are doomed to be cut off in their prime to give place to manicured, wired-up rows of gladioli. That's all right for professional florists and estates with staffs of seventh-generation British gardeners, but it's more entertaining, educational, and downright beautiful to allow a miscellaneous, only slightly controlled growth to take place in the bench soil, with potted subjects set in here and there, and vines, hanging baskets, and even flowering trees above. Prunings and accidental break-offs can be rooted and tucked in to fill vacant spaces; and there is always plenty of material for gifts, bowl-gardens, and arrangements. Even a small greenhouse planted in this way is of great general interest, for it is a junior-grade botanical garden. And it's good insurance too, for if a plant sickens or dies in one position, very possibly it will thrive in another. (The best insurance, of course, is to have one of everything in a pot as well, for quick removal in case of a fire or a freeze.)

Very often when plants start traveling, the effects thus created are more unique than man-made plantings, so it is wise to allow them to make their own plans. The attractive *Cymbalaria muralis* has rejected all my efforts to grow it in pots and hanging baskets, but it has homesteaded its own spot on a sunny patch of mossy wall, doubtless out

of nostalgia for the Roman Coliseum for whose walls, I understand, it was named. It also has an affinity for the osmunda fiber in the orchid pots, where its delicate leafage and perpetual posies are in artistic contrast with the stark rigidity of the cattleyas. The greenhouse is sixty by forty feet: how far is it, Pythagoras, from one corner to the diagonally opposite one? For those are the only two places where this little Kenilworth ivy will grow; at the cool, sunny end on living moss and at the humid, shady end on dead moss roots. Clearly, it knows more than I do; it knows what it wants and how to get it.

Then there's *Hypoëstes sanguinolenta,* spoken of as "measles plant" because of the pink rash on its leaves. Leggy and droopy as it is in a pot, *H. sanguinolenta* is an accomplished traveler with a talent for selecting spots that no sensible plant would consider, and its small colorful seedlings crowd the cracks in the wooden floor. About five years ago, one settled into a three-ounce hole in the cement floor of the potting-room; from there it has spread into a four-foot circular rug that blooms the year round, despite flood, drought, starvation, and the plumber's tools dumped on it. This accidental effect attracts more attention than anything we've planned. The plant is also attracted to the orchid-pots. So are a couple of begonias, seedlings of *B. leptotricia* and *B. picta rosea.* Ordinarily begonias of the non-bedding type do not seed themselves, but these two travel far and establish themselves with a decorator's taste. One would think their tiny seeds would germinate in the warm, moist soil of the benches at the feet of the parent plants, but they somehow jump the aisle and grow only in the wiry mass of the osmunda roots.

Tradescantias will take a great deal of bench and under-bench space for themselves unless curbed. There is confusion in the nomenclature of these creepers, all of which appear more or less alike to my untutored eye: they are as likely to be sold as *Cyanotis, Commelina, Setcreasea, Callisia, Spironema,* and *Zebrina* as *Tradescantia.* The most common ones are the least attractive: *Tradescantia flumi-nensis,* which is one of the biggest bores in horticulture, and *Zebrina pendula,* which at least has some color to its leaves. I have never seen either in bloom. There are better candidates as weeds under glass. *T. multiflora,* an ever-blooming, tiny-leaved species, of which I brought one small twig back from Guatemala years ago, now fills the wheelbarrow several times a year when I get round to the job of thinning. It is a popular house plant, and one year the whole neighborhood cooperated in eating coconuts so the shells could provide hanging containers for *T. multi-flora* at a P.T.A. sale. *Spironema fragrans* is a good subject for pots or baskets, for under the bench or for leaning over its edges. And *Cyanotis veldhoutiana,* with its velvety kit-ten-ear leaves, is a new and easy species. *Tradescantia blossfeldiana* has the showiest flowers of the group, and it has the decorative habit of letting its shoots grow down and then turn up at the tips like an elegant chandelier. In 1945, E. J. Alexander, Associate Curator of The New York Botanical Garden, discovered a fine setcreasea in a garden in Mexico City and introduced it to the Garden; in 1953, when this plant was being propagated commercially for introduction to the horticultural trade, T. H. Everett, Assistant Director (Horticulture), suggested that it be given the name 'Purple Heart'. Its leaves are truly purple and its flowers a lovely pink-lavender. *Callisea elegans* offers striped, waxy leaves and white flowers, and *Rhoeo discolor* makes tight, upright clumps. The velvety brown *Cyanotis kewensis* is charming, but I find it difficult. Two other tradescantias are considered as succulents and make tight, flat rugs if given space; they are *Tradescantia navicularis* and the hairy *Cyanotis somaliensis.*

Among taller plants for the background or the center of a bench are "cherry sage" *(Salvia microphylla)* and blood-flower *(Ascelpias curassavica),* a tender relative of the butterfly weed *(A. tuberosa)* of our roadsides in summer. These seed themselves with discretion and bloom all year. A packet of dill seed will provide lacy plants that will self-sow for a lifetime and find their way regularly into

Left. *Chlorophytum elatum,* under a bench in the author's greenhouse, has a number of offsets which will make gift plants. Below. *Ctenanthe oppenheimiana* forms a very attractive and compact clump.

friends' kitchens. It's fun to let a few seedlings of *Mimosa pudica,* the sensitive plant, grow to show off its leaf-closing characteristic. *Neomarica gracilis,* the apostle plant, is good too, if there is room; it will root its flowering tips at intervals. This is a good gift plant. One little amaryllid, *Habranthus robustus,* is a charming weed; I have no idea where it came from, but year after year it shows up in new places with lovely pink flowers and beautifully packed pods.

I hope never to be without the creeper *Polygonum capitatum,* which occasionally withstands winters here in New Jersey. It has small oval leaves with brown centers and tiny globular pink flowers, which it produces continually under glass. It is a relative of the worst invader I ever had to contend with outdoors, a gift I unhappily received into my garden when a friend asked if I wanted some "bamboo". This proved to be *P. cuspidatum,* called, heaven knows why, Mexican-bamboo, and it's a fearsome thing.

A genus that is now becoming popular indoors is *Plectranthus,* closely related to *Coleus. P. australis, P. thunbergii,* and *P. oehrtendahlii* make excellent bench-weeds, as they creep along attractively on their "elbows," and they also grow well, in the modern manner, on chunks of wood. *P. coleoides,* a newcomer, is variegated.

Pilea microphylla, the artillery plant, moves by self-sowing and has a talent for getting into bonsai pots where it looks quite nice. Its two tiny relatives, *P. depressa* and *P. nummulariaefolia,* are good groundcovers, though quite greedy; and the same is true of the old standby *Saxifraga sarmentosa* and the tiny *Helxine soleirolii,* the baby's-tears of florists. These very small-leaved plants are also charming when planted pot-within-pot-within-pot, like a rising, narrowing tower, and allowed to splay down like a fountain over the whole structure.

Vines are occasionally acceptable weeds. *Cissus adenopodus,* a velvety grape from Africa, has lined the under side of the nylon netting that shades the orchids, and its desirable seedlings show up in shady places. *Maurandia barclaiana,* which has recently been retitled *Asarina antirrhiniflora,* climbs by hooking its petioles over any available prop. Darwin reported in his book on climbing plants that a loop of thread weighing one eighth of a gram would cause these petioles to bend. This delicate vine blooms always, but the related and ubiquitous *A. erubescens* flowers for just a short period. *Aristolochia elegans* is grown in our greenhouse for its odd Dutchman's-pipe flowers, its curious umbrella-seed-pods, and for the song sparrow which nests in it every spring and may be responsible for some of the seed-sowing. This vine gets very heavy and is best cut down almost to its base in the fall. All these vines seed themselves and can be used as annual climbers outdoors.

Cacti occasionally behave as weeds, especially the opuntias, which drop their pads here and there. A pad of *O. vulgaris,* which fell under the heating pipes, has grown into a twelve-foot blooming tree with a thigh-sized trunk. A pad of *O. elata,* which was received from Japan a decade ago, fell behind a bench, showed up a couple of years later, is now seven feet tall, and blooms and fruits every summer despite a total lack of light on its lower half. The combined footage of our three ten-year-old plants of *Hylocereus undatus* would be enough for a Hollywood epic. Each has many twenty-foot arms coiled under the rafters and extending along the poles, and if I turn my back for a moment, they sneak a few spaghetti-like roots into the soil and boost themselves along further. These marvelous plants bloom intermittently all summer and fall, and people come from a distance to watch the gigantic white flowers open as the night darkens. The preopening buds can be removed in the afternoon, placed in a dark closet, and "forced" so they will unfold visibly on the dinner table. This summer we crossed one on *Selenicereus boeckmanii,* and back the other way, and each cactus grew a surprising fruit; the hylocereus produced an over-sized scarlet artichoke which ultimately exploded, and the selenicereus is still wearing a bristly red golf-ball.

Other succulents provide excellent groundcovers, such as *Aptenia cordifolia,* one of the "ice plants," which moves around by zigging and zagging; a modest creature, it never crowds other plants, but goes around them. *A. cordifolia* carries little lavender dandelion blooms. *Ceropegia debilis* forms a solid curtain from the bench to the floor, and it will vine upwards as well. Among the crassulas are three fine creepers: *C. spathulata, C. marginalis* and the smaller *C. marginalis minima. C. schmidtii* and the similar *C cooperii* make dense mats, and *C. lactea* and *Kalanchoë longiflora,* which grow a little taller, are good fillers. A pair of highly imaginative characters are *Kleinia stapeliaeformis* and *K. pendula,* which are prone to bend over at the tip, dive underground, and come up several inches away, much in the manner of porpoises. All these succulents can be interplanted with other types, for an excess of water doesn't seem to hurt them, perhaps because of their shallow roots.

Some of the "footed" ferns, such as davallia and polypodium, get around quite nicely, both horizontally and vertically, if they are provided with damp sphagnum to travel upon.

At least two orchids are weeds at heart; one is the ter-

Kleinia stapeliaformis grew downward and came out of another pocket in this strawberry jar that also contains, clockwise, *Cyanotis somaliensis, Sempervivum, Tradescantia navicularis, Sedum dasyphyllum,* and *Crassula lycopodioides.*

restrial *Epidendrum o'brienianum,* a hybrid of *E. radicans,* which strides around on tall stilts of aerial roots, and vanilla *(V. fragrans)* grown as a curiosity, for it rarely blooms and snakes about under a bench. A delightful small tree, which could fit into any greenhouse, is the dwarf *Poinciana pulcherrima;* it grows rapidly, blooms young, and is lacy and attractive at all times.

There are many more desirable greenhouse subjects that are able to perform spontaneously and handsomely as "plants out of place." I have been fighting this article's strong desire to reduce itself to a list—but now I shall give in to it.

SELF-SOWERS

Passiflora edulis	purple granadilla
Ricinus communis	castor-oil plant
Thunbergia alata	black-eyed Susan vine
Solanum pseudo-capsicum	Jerusalem-cherry
Capsicum frutescens	red-pepper
bedding begonias	

CREEPERS

Asparagus asparagoides	smilax
Stenotaphrum secundatum	St. Augustine-grass
Senecio mikanioides	German ivy
Nertera depressa	bead-plant
Jasminum mesnyi	
Lantana montevidensis	weeping lantana
Beloperone comosa	
Solanum jasminoides	
selaginellas	
ivies, philodendrons, and syngoniums	
columneas	
Succulents	
Huernia pendula	
Kleinia radicans	
Aporocactus flagelliformis	rat-tail cactus
Stomatium fulleri	
Anacampseros poellnitzianus	
Chamaecereus silvestri	peanut-cactus
most ceropegias, haworthias, sedums, sempervivums, and faucarias	

PLANTS FORMING CLUMPS

Pachystachys coccinea	
Pilea cadieri	
Marantas, calatheas, and ctenanthes	
alternantheras	
ruellias	
small-leaved peperomias	
most bromeliads	
Succulents	
Kleinia articulata	candle-plant
Senecio scaposus	
Euphorbia pentagona	
stapeliads	
Many sedums, crassulas, and mesembryanthemums	

BULBS, TUBERS, CORMS, and RHIZOMES

Eucharis grandiflora	Amazon-lily
Clivia miniata	
Strelitzia reginae	bird-of-paradise
Doxantha unguis-cati	cats-claw
Tulbaghia violacea	
Haemanthus albiflos	
Oxalis	
rhizomatous begonias	

"LEAF-PROPAGATORS"

Succulents
Crassula argentea and hybrids
Graptopetalum and *Graptoveria* sp.
Pachyphytum and *Pachyveria* sp.
many kalanchoës and sedums

OFFSETS, RUNNERS, ETC.

Chlorophytum sp.	spider-lily
episcias	
Succulents	
Kalanchoë synsepala	
aloes, haworthias, and gasterias	
sempervivums	
mammillarias and echinopsis	
agaves	

AERIAL ROOTERS

philodendrons
Succulents
Cereus
Some kalanchoës

GARDENING WITH GRANITE (Continued from page 19)

pre-historic burial ground and cover it with round rocks. Make slopes by excavating the center and work up from the lowest point. Build it in tiers. Get a book on the construction and the soil to use. Don't surface it with rocks which may have turned up in your diggings. Use rocks, flat-topped if possible, which may lie comfortably on each other, and which have been weathering and acquiring lichens since the last glaciation. Make the rockery look natural; don't plant dragon's teeth.

And a little advice to those who have the advantage of a slope: if there is an available water supply, even if it is only a trickle, take full advantage of it. If you can't produce a stream, make a moraine which looks as if it once held water. Don't introduce artificial mammals, birds, or exaggerated plastic butterflies on rods, and *please* no teutonic gnomes.

Try to make your alpines feel at home. In motley company any self-respecting edelweiss would give up the ghost.

Consult your gardening neighbors and your local nurseryman about the plants that are most likely to succeed in your environment. There is a freemasonry among gardeners, which unhappily does not exist in international relations. Everyone wants to help, even if you may have to disregard some gratuitous advice.

Start with the plants most easily grown, with which you will be contented unless you get the "bug." If that infects you, you will be hopelessly incurable. Once the virus takes hold, you will be more boastful about persuading an *Aquilegia jonesii,* with constant nursing, to winter over and prosper the following year than of the ninety and nine that survive with little care.

At the bottom of the garden, near the lower pool, there is an enchanted spot in semi-shade where, if it were in the Old Country, one might expect to surprise pixies in an antic dance. Here, at the foot of a mossy ledge, my wife takes time off from her rose garden and countless other occupations to act as nurse to a small planting of *Cyclamen europaeum.* She coaxes them to come to the surface, and, as I write this in late August, there are several in bloom.

Sometimes I try to visualize the site if it were abandoned, which must happen one of these days, and left to shift for itself. At first, the grasses would come in every-

where. The heather would survive in competition with the weeds. All our carefully nurtured rarities would disappear within a few years. But beyond all this, I am convinced that the Creator in His infinite wisdom designed our part of New England for forests. It is a constant uphill fight to keep the trees from engulfing us. Every year countless thousands of seedlings of maple, birch, and white pine crop up in our gardens, and if neglected would soon take over and revert to the forest primeval.

To quote Voltaire, "Il faut cultiver notre jardin."

SARATOGA FOUNDATION (Continued from page 24)

cessful have been *Arctostaphylos densiflora* 'Howard McMinn', *Ceanothus horizontalis* 'Yankee Point', and *Ceanothus* 'Ray Hartman'.

The genus *Arctostaphylos,* commonly called manzanita, is important in California because of its variability and widespread distribution, particularly in the chaparral. (Chaparral is California's counterpart of the Mediterranean maquis or garrigue.) Manzanitas are evergreen shrubs with crooked branches which are covered with a smooth, dark red bark. Their flowers are small and bell-shaped, much resembling those of some of their relatives in the Heather Family. *A. densiflora, A. hookeri, A. stanfordiana,* and *A. uva-ursi* have been the species most useful at the Foundation in the production of good selections for garden ornamentals. Seven of these have been named as clones and are in the trade. In addition the Foundation has an unnamed clone of *A. manzanita* for future introduction.

Another California genus which is often found in the chaparral is *Ceanothus,* the mountain-lilac. It has several species that are useful ornamentals when grown under conditions favorable to them. *C. griseus* var. *horizontalis* 'Yankee Point' is a form of the Monterey creeper selected from many thousands of seedlings grown from seeds collected at Yankee Point near Carmel, California. The clone 'Yankee Point' is replacing another called 'Hurricane Point' because of its darker blue flowers and longer life expectancy. 'Yankee Point' is a low-spreading to prostrate shrub about two or three feet tall and produces its dark flowers abundantly in April and May. It grows best on a cool slope. A much larger and taller-growing shrub is *Ceanothus* 'Ray Hartman', which becomes ten to fifteen feet tall and twelve to fifteen feet wide, and may represent a hybrid between *C. arboreus* and *C. griseus.* It comes into flower in March and April and grows best in the sun. Other successful selections of *Ceanothus* introduced by the Foundation are 'Emily Brown' and 'Julia Phelps'.

Rhamnus californica is an evergreen California shrub belonging to the Buckthorn Family. The clone 'Sea View' came originally from the Carmel Highlands. It is a low compact shrub, from eighteen to thirty inches tall, with red berries in summer which turn to black in the fall. It grows in full sun.

Garrya elliptica, the silk-tassel shrub, another California evergreen shrub, is dioecious, and its small flowers are borne in catkins. The male catkins or tassels are lime-colored and several inches long. The clone 'James Roof' has tassels eight to twelve inches long; these are produced on second-year plants while they are still in gallon cans.

WALTER EGLER (Continued from page 16)

spite of most desperate efforts made by the crew, the boat was inexorably swept backwards toward the brink of the falls. Four men made their way to the riverbank above the drop; the fifth was carried, in the water, over the falls. Dr. Egler was last seen still sitting in the craft as it disappeared from view over the crest.

Two days later Walter Egler's body was found some five kilometers downstream. He was interred in a jungle grave—that jungle that he had striven so much to understand and to interpret.

The man who had plunged over the falls, but in the water, survived without injury. Two other men involved in the tragic accident sustained relatively minor hurt.

Walter was born of parents of German origin, Frederico and Izabel Egler, in Rio de Janeiro on November 24, 1924. He was educated in the Ginásio Cruzeiro, attended chiefly by children of German background, the Colégio Ferreira Pinto, and the Escola Nacional de Agronomia, from which he obtained the degree of Engeneiro Agronômico. A thorough academic background in the natural sciences, and the tutelage of his father who was an optical physicist, well equipped the young man for a scientific career.

Successively he held jobs at the Jardim Botânico and Museu Nacional, both in Rio; in 1947, he became Assistant in Geography at the Conselho Nacional de Geographia. As a geographer Egler performed extensive field work in many parts of Brazil.

In 1955 Dr. Egler was offered the directorship of the Museu Paraense Emilio Goeldi, in Belém, Pará, seaport for the Amazon Basin. During his scant seven years at the Museu Goeldi, the botanical garden, the zoo, the laboratories, and the library were reorganized, and the historically very important herbarium was provided with air-conditioned, vermin- and mold-proof housing, an innovation in tropical museums.

His research programs developed around the floristic investigation of the vast Amazonian forests and savannas. He became especially interested in the geography and ecology of savanna vegetation.

It was with the intent to further these far-reaching studies, and to begin a systematic inventory of the plant resources of the Amazon Basin, that the Conselho Nacional de Pesquisas (controlling the affairs of the Museu Goeldi), the Instituto Agronômico do Norte at Belém, and The New York Botanical Garden began a collaborative three-year program of exploration of the Territory of Amapá, a precursor program important in itself but intended to become the prototype of a progressive plant inventory of the greatest of all tropical areas, the rain forests of the Amazon Basin.

Investigations of Amapá were planned to proceed in three stages, chiefly along the major rivers and in the coastal savanna regions. In 1960 the initial exploration was carried out to the headwaters of the Rio Oiapoque, separating Amapá and French Guiana. Dr. Egler, Dr. Irwin, Dr. Pires of the Instituto Agronômico, Lubbert Westra of the University of Utrecht, and I took part in this expedition.

The 1961 program was organized in two concurrent

(Continued on Inside Back Cover)

FOUR ORCHIDS RECOMMENDED AS HOUSE PLANTS

By PAUL SCHUTZ

Mr. Schutz is Assistant Librarian in The New York Botanical Garden.

UNTIL RECENTLY orchids have seldom been recommended as house plants. They were considered too fragile, too rare, too expensive, too exacting in their requirements. These opinions have been changed, however, and today they are frequently described in popular articles and in advertisements as ideal house plants. Although these statements are misleading, they have some elements of truth in them. Some species of orchids may be easily grown in the average overheated living-room, provided certain requirements are met.

Many orchids do not need high humidity. They have hard, fleshy, water-holding leaves with a thick cuticle that prevents evaporation. Sufficient humidity for such plants is provided by setting pots in a wooden box, six inches deep, and painted on the inside with a thick layer of asphalt mixed with asbestos to prevent leakage. The bottom of the box is covered with a three-inch layer of pebbles or crushed bluestone, and a spout at one side drains off excess water. Watering the orchids keeps the gravel wet enough to create sufficient humidity.

Rather than high humidity the most important requirement is light. A sunny south window that has at least three hours of sunlight is the best location for the plants during the eight or nine months they remain indoors. In summer the plants should be placed outdoors in a shady spot for two weeks and then may be moved to sunnier areas. Vandas, which tolerate almost full summer sun, may be placed toward the outer edge of a tree that gives light shade, such as a mimosa *(Albizzia).* Oncidiums which require more shade (otherwise their foliage will yellow) should be placed in dappled sunlight, about halfway between the trunk and the outer rim of the branches. Paphiopedilums—more frequently called cypripediums—require practically full shade.

A south or a west window is the most satisfactory, because of the strong afternoon sun; but if neither a south nor a west window is available, a window with an eastern exposure will do for oncidiums and paphiopedilums. I doubt, however, whether vandas would grow well there, and I am sure they would not bloom. I need hardly mention that a southwest or southeast window is better than either a west or east window. Since the vandas require so much sunlight, they should be placed at the front of the box close to the window, but not touching it; the paphiopedilums should be placed in the rear of the box away from the window. The pots should be turned occasionally, so that all sides of the plants receive light.

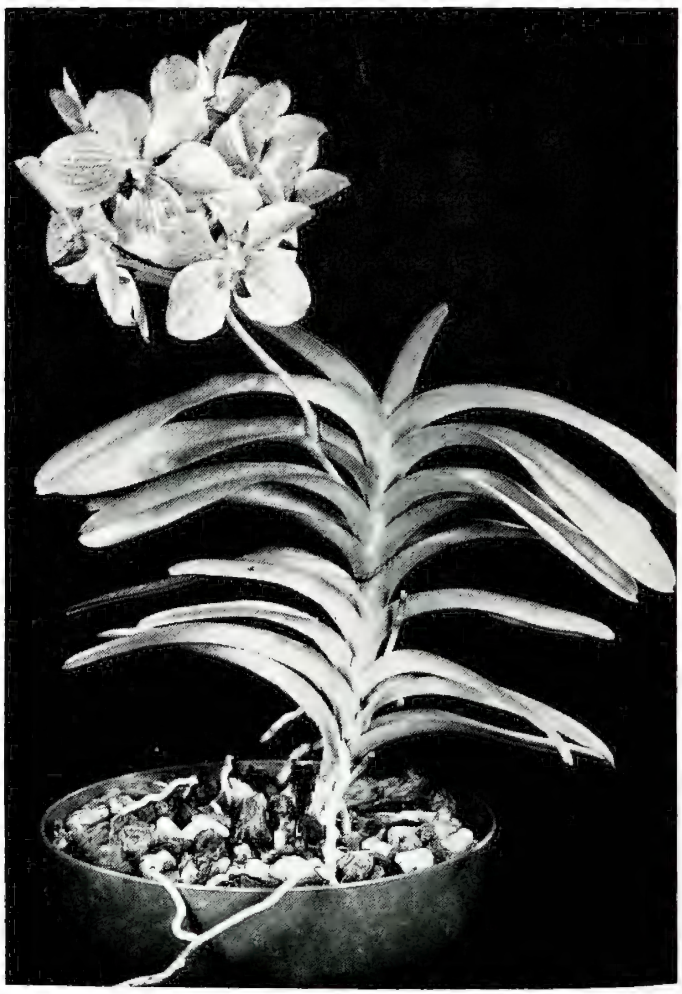
Although porous clay pots are best for orchids that are grown in the greenhouse, plastic or glazed pots are best for orchids grown in the home. Large drainage holes can be drilled in the bottom of plastic pots; there should be at least five holes, each a quarter of an inch in diameter.

Fir bark is by far the most convenient medium in which to grow orchids and has given excellent results with the four orchids that I recommend as ideal house plants. I use a very coarse grade for *Vanda rothschildiana;* a medium grade for *Oncidium sphacelatum,* and a mixture of the fine and medium for *Oncidium* 'Java' and *Paphiopedilum lawrenceanum.* In potting, wash the bark free from dust—a colander with a large mesh can be used for this operation; then soak the bark overnight. First fill the pot one-quarter full of crushed bluestone or large pebbles; these should be washed free from fine particles which might interfere with drainage. Then cover with a one-inch layer of the fir bark. Hold the plant in the pot, with the base of the plant about one inch below the rim of the pot, and fill with the moistened medium, pressing it firmly about the roots. The vanda will present difficulties, because the roots arise along the stem. Fill up to the base of the plant and cover an inch or two of the stem to get all the roots within the pot and to encourage new roots to form. Cover only the base of the pseudobulbs of the oncidiums, and take care not to cover the crown of the paphiopedilum.

Vanda rothschildiana requires a ten-inch pot; *Oncidium sphacelatum* an eight-inch pot; and *Oncidium* 'Java' and *Paphiopedilum lawrenceanum* five-inch pots.

After potting, water the vanda every day, pouring the water over the plant so as to wet the leaves and the roots that emerge along the stem. The oncidiums and paphiopedilum should be watered every other day. Always wet the leaves to wash off any dust and to prevent dehydration from

This plant of *Vanda rothschildiana,* grown by the author, carries nine flowers on one raceme.



low humidity. It is advisable not to use cold water: add a little hot water to it to avoid chilling the plant, which may result in retarding growth. Always drain excess water from the bottom of the box, after watering the plants.

Once a week it is a good practice to apply liquid fertilizer, alternating an organic fertilizer such as manure water with an inorganic fertilizer such as "Hyponex." To make manure water, soak a cup of dry cow manure in a gallon of water overnight and then strain it. Use "Hyponex" as directed—a teaspoon to a gallon of water.

These four orchids are warm-temperature plants; they should be grown in a moderately warm room such as the living-room, never in a bedroom where windows are open at night. The night temperature should not generally fall below sixty degrees, but an occasional drop to the fifties will do no harm. Temperatures in the low eighties are satisfactory during winter, but higher temperatures are likely to dry out the atmosphere and may harm the plants. High temperatures in summer will not injure the plants, if they are watered daily and the soil below the plants is kept moist to maintain humidity.

These plants are pest-free except for slugs which sometimes attack them in summer. Dead organic matter should be kept away from the plants, as slugs breed in such material. I have not tried growing these orchids in my home during the summer, but I understand this can be done if windows are kept wide open to admit as much air as possible—and if the paphiopedilum is kept out of direct sunlight.

If these general instructions are followed, these four orchids should grow and bloom for other home gardeners as well as they have for me for three years. *Paphiopedilum lawrenceanum* and *Oncidium* 'Java' have bloomed twice a year for me, and will do so if repotted every summer. *Vanda rothschildiana* and *Oncidium sphacelatum* bloom at least once a year. If *V. rothschildiana* gets good sunlight in winter, it is capable of blooming twice a year, and the flowers remain in good condition for more than a month.

Vanda rothschildiana is a beautiful hybrid, one of the most beautiful of all orchids. It is easy to grow and bring into bloom, if it is given plenty of sunlight and water. The plant has no specific rest period—it continues to grow through the year. It grows very slowly and does not increase in size rapidly. Under ideal tropical conditions, *V. rothschildiana* will produce a raceme of flowers four times a year, as it did for me in Honolulu. The leaves are arching and strap-shaped, folded in the middle. The tips are notched. The leaves are arranged alternately about a central stem in one plane only as are the leaves of iris and clivia. From their axils the raceme arises; only one raceme is produced at a time, and each one bears from six to ten flowers. They are flat and are from two and a half to three inches in diameter. The short lip is a dark violet, while the petals and sepals are a light violet-blue overlaid with a fascinating checkered pattern of darker violet-blue veins. The pattern is more marked on the two large lower sepals. Because of their thick texture, the flowers are long-lasting. When grown in the home, this vanda will bloom in the fall and, if fertilized, may bloom in midsummer as well.

The blooming period of *Oncidium sphacelatum* is very unpredictable. Plants have bloomed for me during summer, fall, and late spring, but only once each year. However, if one has several plants, which can be obtained by dividing the plants when they are large enough to be transplanted, one can have flowers in all three seasons, as all plants will not bloom at the same time. The flowers are very small, about three quarters of an inch in diameter, but produced in immense panicles up to three feet in length, each bearing from fifty to seventy-five flowers. They are a bright yellow, with brown markings on both sepals and petals, and remain in good condition for about three weeks. The plants are large and vigorous, with long arching leaves like those of the day-lily. They have pseudobulbs from three to four inches long. Abundant white roots are produced from their base. In repotting, the old pseudobulbs should be discarded, and since they grow rapidly, the plants should be divided.

'Java' is a very beautiful, small but vigorous oncidium, with strap-shaped leaves to six inches long and oval pseudobulbs to two inches long. There are only two leaves to a pseudobulb. The panicle is about a foot long and bears from six to fourteen bright yellow flowers with rich brown stripes on petals and sepals. Both petals and sepals are small, but the lip is large. The plant produces its panicles of dancing flowers two or three times a year—in summer, fall, and spring. After the flowers fade, a new pseudobulb is formed which in turn produces a new flower panicle.

Paphiopedilum lawrenceanum has beautiful bright green leaves veined with a checkered pattern of olive-green. The strap-shaped leaves are arranged alternately as in the vanda, but without a visible stem; they grow from the base of the plant. The plants soon form compact clumps of these leaf-crowns, and from each mature crown a stem will arise, holding it at its apex a solitary flower. The stem is about six inches high; it is completely covered with stiff, dark brown hairs. The flower is large, three and a half inches across—sometimes up to five inches. The hood-like sepal arches over the glossy brown pouch or lip. The sepal is a pale greenish white, veined with green and purple-brown and flushed at the base with pink. The narrow petals, curving outward from the pouch, are pale green with dark brown shadings. They are also sprinkled with dark brown hairy warts.

These four orchids can be obtained by mail from commercial orchid growers who raise plants for amateurs. The fir bark can also be obtained from the same sources. A selection of plastic pots in assorted sizes and colors is to be found at any large Woolworth or similar store. I advise purchasing mature plants, as they are more easily grown, and one will not become impatient before they bloom. Actually it takes a full year, sometimes two years, for an orchid plant to adjust itself to its new environment in the window of a living-room. The home gardener should not become discouraged and discard a plant if at the end of the first year it does not appear to be growing well; it will usually prosper and bloom within the second year.

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THE RACHEL McMASTERS MILLER HUNT BOTANICAL LIBRARY: A CENTER OF RESEARCH

By HAROLD WILLIAM RICKETT

Dr. Rickett is Bibliographer and Senior Curator of the Library of The New York Botanical Garden.

READERS OF *The Garden Journal* will recall a review, by Dr. W. C. Steere, of the first volume of a catalogue of the botanical library of Mrs. Roy Arthur Hunt. Mrs. Hunt has spent most of a lifetime in a discerning search for the masterpieces of botanical literature. The result is a remarkable collection of botanical manuscripts, original paintings, prints, incunabula, herbals, published works of every description, most of them rare, many of them in the original bindings.

For many years this collection was kept in the Hunts' home. As time went on the necessity of a permanent housing for it became obvious. The result is the Rachel McMasters Miller Hunt Botanical Library of the Carnegie Institute of Technology in Pittsburgh. This occupies a penthouse atop the new general library of Carnegie Institute, the whole building being the gift of Mr. Hunt. The accompanying photographs give some idea of the modern structure and equipment of the building and of the appropriately beautiful quarters of Mrs. Hunt's collection. The library maintains its own bindery, presided over by Thomas W. Patterson, expert in fine hand binding—an art in which Mrs. Hunt is herself proficient.

It is the wish of Mr. and Mrs. Hunt that the botanical library should not be a static collection of rarities but that it should serve the botanical world. With that in mind they appointed as Director not a librarian but a botanist: Dr. George H. M. Lawrence, formerly Director of the Bailey Hortorium of Cornell University. Under Dr. Lawrence's leadership and with the help of an Advisory Committee appointed at his recommendation, plans have been developed for making the library a center of bibliographic research and a repository of bibliographic information. Facsimiles of rare works will be issued and certain rare and important works will be republished.

Dedication of the Library took place on October 10, 1961. Addresses were made by the President of Carnegie Institute, Dr. John C. Warner, by Mr. and Mrs. Hunt, and by others.

Honorary degrees were conferred upon Dr. Otto Emery Jennings, long known as an authority on mosses and on the flora of Pennsylvania, and Dr. Lawrence Clark Powell, Dean of the School of Library Service, University of California at Los Angeles, who made the principal address, speaking on "Building, with Books."

The formal dedication was followed by a luncheon for all who attended the ceremony, and a tour of the library.

The Hunt Library, gift of Mr. and Mrs. Roy A. Hunt to Carnegie Institute of Technology.

The rare book gallery in the Rachel McMasters Miller Hunt Botanical Library that occupies the penthouse of the Hunt Library.

This was followed, on two successive days, by conferences of the Advisory Committee with Dr. Lawrence and the Hunt family, at which the plans mentioned above were developed.

The members of the Advisory Committee are: John S. L. Gilmour, Director, University Botanic Garden, Cambridge, England; Dr. Mildred E. Mathias, Professor of Botany and Director of the Botanic Garden, University of California, Los Angeles; Dr. Rogers McVaugh, Professor of Botany, University of Michigan, Ann Arbor, Michigan; Dr. Harold W. Rickett, Bibliographer, The New York Botanical Garden, New York; Dr. Reed C. Rollins, Asa Gray Professor of Botany and Director of the Gray Herbarium, Harvard University, Cambridge, Massachusetts; and Dr. Frans A. Stafleu, International Association of Plant Taxonomists, Utrecht, The Netherlands.

MRS. HUNT SPEAKS

The following remarks were made by Mrs. Hunt at the dedication of the Hunt Library.

"My botanical collection was begun many years ago. Perhaps the foundation for it was the letter that when I was a very little girl of five or six years, I wrote to Santa Claus. I had utterly forgotten about it until I came across the letter among my father's papers after his death some years ago.

"This is the letter. 'Dear Santa Claus, I have a nice big doll—her name is Ellen Douglas for the Lady of the Lake. I do not need another doll. I want a book.'

"Over my lifetime, this botanical collection has grown. It has been widespread—incunabula, herbals, books on agriculture, books on landscape gardening, books on botany, flower books, color-plate books of the eighteenth century; botanical prints and original drawings, botanists' autographs. Bookplates, too, enter into the picture. All are deposited, with certain memorabilia, in the penthouse library.

"There have been many rewarding and interesting friendships among booklovers. One strange incident occurred when Lord Wakehurst, the present Gouvernor of Northern Ireland, came to our house for tea some little time ago. He looked around my library at Elmhurst and said, 'My father was a botanist.' This, of course, aroused my curiosity. 'What was his name?' I asked. He told me, and I said, 'I have a book from his library!' I got from my shelves the copy of Pritzel. Pritzel, by the way, is the botanist's encyclopedia. My copy has his father's bookplate, and Lord Wakehurst has signed this copy two different times on his visits.

"A few words about two gentlemen who will administer this library.

"First, the alert, young, and keen Kenneth H. Fagerhaugh who is the Librarian of the Carnegie Institute of Technology. To him, I think, goes the credit for the superb arrangement of the institute library.

"Then, some years ago, I was a member of the Board of the Bailey Hortorium at Cornell University. One of the regrets of my life is that I did not go to Ithaca to meet that famous elderly gentleman—Liberty Hyde Bailey. I had planned to have an interview with him for *The Garden Club of America Bulletin,* of which I was the Editor of garden literature for some twenty-five years. I did not go, and so I missed meeting one of the great personalities of the botanical world.

"Just a few years ago, I had a letter signed by George H. M. Lawrence (then the Director of the Bailey Hortorium) inviting Mr. Hunt and me to the centenary celebration of the birth of Liberty Hyde Bailey at Cornell. We went. Dr. Lawrence, at that moment, became our friend. He came to Pittsburgh several times to see the library at Elmhurst and, when the plans were made for this library, he stood out in my mind as the perfect person for the directorship of the Botanical Library. He had every qualification that I could think of. Many years of his life had been spent in the administrative work of the great Bailey Hortorium, with botanical and agricultural interests, and his knowledge so impressed me that I felt he would be the outstanding person to direct and increase the usefulness of my books.

"Now, it is my duty and my pleasure to address James M. Bovard [Chairman, Board of Trustees, Carnegie Institute of Technology] whose family and my family have been friends over a number of generations. Many years ago I knew a very rich young man who gave his fiancee a gold chain with a fairly large diamond key to his heart as a pendant. Mr. Bovard, I am presenting you with the keys to this Botanical Library. There is no gold chain attached, but *there are diamonds* on the top of the library building."

BRIEF NOTES ON RECENT BOOKS

By ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

PESTS — INSECTS, DISEASES, ETC.

ARE YOU YOUR GARDEN'S WORST PEST? Westcott, Cynthia. 305 pages, illustrated, indexed. Doubleday and Co., Garden City, N. Y. 1961. $4.50.

Dr. Westcott, nationally known as "The Plant Doctor," has plenty to say about all kinds of garden pests in her latest book. She places great emphasis on preventive care, which includes good cultural practices and careful pruning. Especially useful are her tabulations of spraying recommendations for some two hundred specific plants and of optimum pH range for over three hundred and fifty plants. Valuable information will also be found on state, federal domestic, and federal foreign quarantine regulations.

CHECK LIST OF PLANTS AND SOIL NEMATODES: A NOMENCLATORIAL COMPILATION. Tarjan, Armen C. 200 pages. University of Florida Press, Gainesville, Fla. 1960. $7.50.

A comprehensive guide to the nomenclature and pertinent literature of agro- and phytonematodes by the nematologist of the Citrus Experiment Station of the University of Florida.

DWELLERS IN DARKNESS. Skaife, S. H. 180 pages, illustrated, bibliography, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1961. Paper, 95 cents.

This concerns the most ancient of creatures which live and work in highly organized communities—the termites. A paperback reissue.

GARDENING WITHOUT POISONS. Hunter, Beatrice T. 17 pages. Friends of Nature, Belmont, Mass. 1961. Paper, 35 cents; tape recording, $5.00.

Mrs. Hunter recently gave this provocative lecture on gardening without chemicals at Horticultural Hall in Boston. She heartily endorses insect control by means of parasites, microbial agents, hormones, birds, resistant varieties of plants, and companionate planting.

NEMATOLOGY; FUNDAMENTALS AND RECENT ADVANCES WITH EMPHASIS ON PLANT PARASITIC AND SOIL FORMS. Sasser, J. N. and W. R. Jenkins, eds. 480 pages, illustrated, bibliographies, indexed. University of North Carolina Press, Chapel Hill, N. C. 1960. $12.50.

A compilation of a series of lectures and laboratory exercises presented during the Southern Regional Graduate Summer Session in Nematology, held at North Carolina State College, June 8-July 17, 1959.

SOILS AND FERTILIZERS

USING COMMERCIAL FERTILIZERS; COMMERCIAL FERTILIZERS AND CROP PRODUCTION. McVickar, Malcolm H. 286 pages, illustrated. The Interstate Printers and Publishers, Danville, Ill. 1961. $4.75.

A considerably revised and updated (second) edition of a title that first appeared in 1952. A new chapter is devoted to liquid fertilizers.

YOUR GARDEN SOIL; HOW TO MAKE THE MOST OF IT. Carleton, R. Milton. 160 pages, indexed. D. Van Nostrand Co., Princeton, N. J. 1961. $3.95.

This is not an erudite treatise but an understandible explanation of soil make-up, soil tests, fertilizers, weed killers, and the like, which often perplex the amateur gardener. Useful listings are given in the Appendix, such as "Soil Preferences of Plants (pH Readings)"; "Reading Foliage" [for deficiencies]; "Estimating Topdressing Materials for Lawns"; "Where to Send Soil Samples for Testing" (and the cost, if any).

GENERAL BOTANY, NATURE STUDY, GEOLOGY, AND SCIENCE

FIELD BOOK OF NATURE ACTIVITIES AND CONSERVATION. Hillcourt, William. 432 pages, illustrated, indexed. G. P. Putnam's Sons, New York. 1961. $4.95.

A pocket-size revised and expanded edition of *Field Book of Nature Activities*, first published in 1950. Animals, plants, rocks, minerals, and fossils occupy two-thirds of the contents, and the remaining third is devoted to nature conservation. A boon for leaders of nature groups.

THE LIFE OF THE GREEN PLANT. Galston, Arthur W. 116 pages, illustrated, bibliography, indexed. Prentice-Hall, Englewood Cliffs, N. J. 1961. Paper, $1.50; cloth, $2.95.

A concisely written booklet, devoted to the physiology of the green plant and its importance to mankind. One of the excellent "Foundations of Modern Biology Series."

MODERN SCIENCE AND THE NATURE OF LIFE. Beck, William S. 334 pages, bibliography, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1961. Paper, $1.45.

In the introductory note the author states, "Of the many charges being flung at scientists these days, one is that they have failed in their duty to communicate, in a manner intelligible to nonscientific readers, a sense of what is going on in science today, where it is heading, where it is not heading and why not." Dr. Beck answers the challenge in a masterly fashion.

PLANT MARVELS IN MINIATURE: A PHOTOGRAPHIC STUDY. Postma, C. 173 pages, illustrated. The John Day Co., New York. 1961. $12.50.

Seventy-seven plates of superb photography and reproduction. With few exceptions the illustrations are microphotographs (some showing magnification up to X 2,000). A wide range of subjects—staminal hairs of spiderworts, flowering grasses, grains and germs of wheat, fruits of the wild carrot, leaf of stinging nettle, for example. Excellent notes on photographic technique. In the Foreword, Edwin Way Teale writes a glowing tribute to this masterpiece of scientific art.

PLANTS AND X RAYS. Breslavets, L. B. Transl. by Alena Elbl and ed. by Arnold H. Sparrow. 122 pages, illustrated, bibliographies, indexed. The American Institute of Biological Sciences, Washington, D. C. 1960. $5.00.

Originally published in Russian in 1946, this volume contains a summary of the older literature in plant radiobiology. A number of corrections have been made in the English version. The United States Atomic Energy Commission assisted in the publication of this translation.

THE STORY OF GEOLOGY; OUR CHANGING EARTH THROUGH THE AGES. Wyckoff, Jerome. 177 pages, illustrated (part colored), indexed. Golden Press, New York. 1960. $4.95.

For the botanist the study of geology has become a "must." Here is a wonderfully illustrated book that reads like an adventure story. Recommended for all outdoor-minded people.

TEACH YOURSELF BOTANY. Elliott, John H. 214 pages, illustrated, bibliography, indexed. Roy Publishers, New York. 1961. $2.75.

"Do-It-Yourself" guides are very popular these days. Dr. Elliott teaches botany at Leeds College of Technology and offers a meaty pocket-size text.

THE WORLD OF GEOLOGY. Leet, L. Don and Florence J. Leet, eds. 262 pages, illustrated, indexed. McGraw-Hill Book Co., New York. 1961. $1.25.

A collection of twenty papers by eminent scientists on the relation of geology to chemistry, biology, physics, astronomy, mineralogy, and mathematics.

REGIONAL BOOKS

DRAWINGS OF BRITISH PLANTS. Part XVI, Compositae (2). Ross-Craig, Stella. 33 plates. G. Bell and Sons, London. 1961. Paper, $1.50.

Genera included are: *Achillea, Otanthus, Anthemis, Chrysanthemum, Matricaria, Tanacetum, Artemisia, Tussilago, Petasites, Homogyne, Doronicum,* and *Senecio.*

THE FLOWERING PLANTS OF AFRICA: A MAGAZINE CONTAINING COLOURED FIGURES WITH DESCRIPTIONS OF THE INDIGENOUS FLOWERING PLANTS OF AFRICA. Dyer, R. Allen, ed. os. 135 and 136. 22 colored plates, illustrated. The Government Printer, Pretoria, Union of South Africa. 1961. $3.25.

A particularly fine double issue of this outstanding periodical. Unpaged descriptive text follows each plate. Genera include: *Aloë, Arctotis, Bulbine, Crinum, Erica, Euphorbia, Hibiscus, Ipomoea, Kentrosiphon, Oxalis, Petalidium, Podranea,* and *Veltheimia.*

THE SOUTHERN GARDENER. Stewart, Mary B. 436 pages, illustrated, bibliography, indexed. Robert L. Crager Co., New Orleans, La. 1961. $5.50.

In the past, many gardeners in the South have bemoaned the dearth of good gardening

books written exclusively for their needs. The present comprehensive volume by a former president of the New Orleans Garden Society will find a warm welcome. In the Foreword, Mrs. Stewart clearly states the boundaries of the region that her book covers as follows: "begins along a narrow margin of the coasts of North and South Carolina, stretches across the lower part of Georgia, the greater part of Alabama and almost all of Mississippi. It includes all of Louisiana, the coastal edge of Texas, and reaches down into the upper half of Florida and the southern tip of Arkansas. I do not include any mountainous sections where elevations affect temperature."

ECONOMIC PLANTS

CORK AND THE CORK TREE. Cooke, Giles B. 121 pages, illustrated, bibliography, indexed. Pergamon Press, New York. 1961. $7.50.

The literature on the cork tree and its products is scattered throughout so many books that there is satisfaction in finding within the covers of one volume so much information on the many aspects of this subject including history, morphology, culture, and uses. Dr. Cooke was formerly research chemist for Armstrong Cork Company and director of research for Crown Cork and Seal Company.

The Kenneth Post Foundation published Dr. Fox's *Teachers Guide to Flower Arrangement* as a youth education project in New York State. The booklet has been made available to elementary and high school teachers, students, and florists working on youth projects at 25 cents a copy. Requests for this booklet came from other sources, and the Trustees of the Foundation agreed to make it available for general distribution at 50¢ each to cover the cost of printing and handling.

The review of this booklet in the Nov.-Dec., 1961, issue of *The Garden Journal* stated the book was gratis.

REVIEW OF RECENT BOTANICAL BOOKS

CATALOGUE OF BOTANICAL BOOKS in the Collection of Rachel McMasters Miller Hunt. Volume II. Part I. Introduction to Printed Books 1701-1800. i-ccxliv. Plate I. Part II. Printed Books 1701-1800. i-ix; 1-655. Plates II-IX. Compiled by Allan Stevenson. The Hunt Botanical Library. Pittsburgh, Pennsylvania. 1961. ["No copies of this Catalogue are for sale. Distribution of this Volume is made by the L. H. Bailey Hortorium, Cornell University, to institutions and scholars whose collections and work are known to relate directly to the subject matter of this publication."]

Mrs. Hunt's charming Preface to Part I outlines the development of her interest in botanical books of the eighteenth century, after an earlier fascination by incunabula, herbals, and other pre-eighteenth-century books already described in Volume I of this Catalogue. Her account of adventures and experiences in seeking and finding books and her correlation of these magnificent books with the history, the mood, and the splendor of the age is in itself a stimulating and moving human document. The Introduction consists of three original essays, "Eighteenth-Century Botanical Prints in Color," by Gordon Dunthorne; "Gardening Books of the Eighteenth Century," by John Scott Lennox Gilmour; and "Botanical Gardens and Botanical Literature in the Eighteenth Century" by William Thomas Stearn. These three essays will long stand as classics in the history of botany and horticulture. Dr. Stearn's brilliant contribution, especially, should be required reading for all serious students of botany, as he brings together in one place much historical information not easily available heretofore. Even more important than the collection of data is his critical evaluation of the development of new ideas, new principles, and new theories, as well as of the interaction between the men themselves. Part I ends with a chapter, "A Bibliographical Method for the Description of Botanical Books," in which Allan Stevenson puts for the first time into a botanical context the mysteries and complexities of terminology of the professional bibliographer. A perfect mine of information, this chapter provides a full background for understanding the common paper and type sizes of the eighteenth century, as well as the symbols and abbreviations used in Part II.

Even though Part I truly introduces Part II, as indicated, it also stands by itself as an important and significant source of general information. Consequently, the comprehensive pagination of Part I in Roman rather than in Arabic numerals, although reflecting a high level of traditional scholarship, may tend to conceal somewhat its great value as an independent volume of original essays.

Part II consists essentially of the completely annotated Catalogue of eighteenth-century books in the Hunt Library and terminates with an Appendix (a list of facsimilies), an Index to Scientific Names, and a General Index. The Catalogue, its items arranged in chronological order, opens with Number 403, Samuel Gilbert's *The Florists Vade-mecum,* 3d ed., published in London in 1702, and closes with Number 764, James Parkinson's *The Villager's Friend & Physician,* published in London in 1800. Careful reading of Allan Stevenson's explanatory chapter in Part I will greatly increase the reader's enjoyment and understanding of Part II.

In summary, Volume II of *The Hunt Botanical Catalogue,* like Volume I, will be an outstanding reference work as long as books are a cherished part of our culture.

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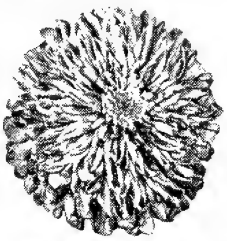

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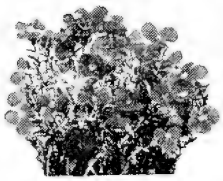

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THE ORGANIZATION OF CELLS AND OTHER ORGANISMS. Picken, L. E. R. 629 pages, illustrated, indexed. Oxford University Press, New York. 1960. $13.45.

GROWTH, DEVELOPMENT, AND PATTERN. Berrill, N. J. 555 pages, illustrated, indexed. W. H. Freeman & Co., San Francisco. 1960. $13.45.

It is appropriate to consider these two books together in a single review, since the subject matter is complementary. There is little overlap, if any, between the material covered, and the method of approach is quite different.

It would be useful to mention briefly the background of the subject matter. From the time that the naked eye was supplemented by the light microscope until the perfection of electron microscope and other special optical tools, the biological scientist has avidly and eagerly examined the physical and chemical structure of cells. As more and more objects were studied, patterns of growth and development became more apparent. These patterns suggested and eventually delimited some (but far from all) of the complexes of organization which we blithely call life. When we add the curiosity which is the foundation of science and the pure esthetic pleasure of seeing within the cell its formed organelles (plastids, nuclei) and now the sub-microscopic organization of even smaller parts, it is no wonder that so many biologists are content to be photographed with a microscope. Finally, there is a belief—almost an article of faith—that the functions of cells, their origins, and their fates are grounded in cell structure.

The development of concepts and theories on the "nature" of cells is, in itself, a fascinating study and one worthy of the attention of the scientist and his lay supporters. This has been succinctly reported by Picken in one of the best chapters on this topic to appear in a long time. Picken goes further than a mere chronicling of dates and names. He has commented on these theories to point up the basis for current thinking on this "fundamental unit" of life and leads into an excellent section on the current concept that a cell is more than a bag chock full of juicy enzymes. He concludes this chapter with a precise statement that, indeed, a cell is organized and integrated—that structure is a necessary prerequisite for activity and that the reverse is equally true. This single chapter of twenty-two pages should be required reading for all budding and budded scientists and could be read with profit by many of our self-professed philosophers.

Were I preparing a reading list for an advanced course in cell development, I would recommend that the student—whether botanically or zoologically oriented—then read *Growth, Development,* and *Pattern* by Berrill. Organized as an advanced textbook, Berrill progresses from the structure of protoplasm to the cell, cell forms, cell aggregates, and cell combinations. He uses both plant and animal examples, carefully chosen for the purpose at hand. With this necessary background, he next considers the alternations in form that are concomittant with growth, regeneration, and reproduction. Emphasis is correctly placed on the patterns and similarities that are exhibited by diverse organisms. He has, unfortunately I believe, separated a section on the plant apex and a section on the development of eggs from the rest of the book. The information is well presented, but would have been better integrated within the framework of the earlier part of the text. Berrill's book is profusely illustrated with clear and generally excellent line drawings which amply point up the well-written text.

Picken's book, on the other hand, is expressly a compendium and reference work with the important extra that the author has given the reader the benefit of his clear, incisive mind and unusually fine sense of logical development. The book would have been better, had the publishers included more illustrations which are available from original research reports. This is, however, a minor quibble and should be balanced against a fine book. I wish I had written it.

RICHARD M. KLEIN

ELECTROLYTES AND PLANT CELLS. Briggs, G. E., A. B. Hope, R. N. Robertson. 217 pages, illustrated, indexed. Charles C. Thomas, Springfield, Ill. 1961. $8.00.

Under the general editorship of Prof. W. O. James of Imperial College, London, Blackwell Publications is preparing a series of botanical monographs specifically designed to "inform the advanced student, assist the lecturer, and be a point of departure for the specialist." The volume under consideration examines the basic problem of how mineral salts enter plant cells.

The subject of mineral uptake is a difficult one with ramifications into a variety of other fields—a not unusual phenomenon in biology. A reasonable foundation in mathematics, physical chemistry, plant ultrastructure, and inorganic chemistry would be most valuable for the reader. With this background, *Electrolytes and Plant Cells* can be read with profit. The book is unusually well written, the illustrations are generally excellent, and the organization is superior. The authors are very well known in this field, and their writing gives evidence of this. This is a book for the professional botanist; it will be widely used.

RICHARD M. KLEIN

THE WONDERFUL LIFE OF FLOWERS. Jaeger, Paul. 195 pages, illustrated, indexed. E. P. Dutton & Co., Inc., New York. 1961. $15.00.

Paul Jaeger is Professor of Botany in the Faculty of Pharmacy at Strasbourg. This work is translated by J. P. M. Brenan of the Royal Botanic Gardens at Kew, who writes, "This is probably the first English text since Kerner von Marilaun's great work . . . to deal in so extensive a way with floral biology in its many aspects."

The book is about equally divided between text and "plates" (printed on a different stock but included in the pagination). The contents and style of the text indicate an intelligent lay audience on a much larger scale abroad than exists in this country. It is a fairly technical account of the morphology and physiology of flowers, including recently acquired knowledge of photoperiodism, effects of temperature, and so forth, with a considerable treatment of pollination by wind, insects, bats, and birds. While much recent science is admirably summarized, in some subjects the author seems not quite up-to-date. The photographs, many reproduced in full color, are superb. Many of them represent small flowers and parts of flowers highly magnified. While most of them are not directly referred to in the text, they give a new insight into the "life of flowers," forming what is almost a separate work. They are largely the work of R.-H. Noailles.

H. W. RICKETT

KANSAS WILD FLOWERS. Stevens, William Chase. 461 pages, illustrated. University of Kansas Press, Lawrence, Kan. 1961. $8.00.

Although indicated as a second edition, no revisions or changes could be detected compared with the first edition (1948). The book continues to be the only helpful flora available to the amateur botanist who wishes to identify the common flowering plants of Kansas and surrounding areas (the Middle West). An introduction discusses the plant and its structures and includes a key to families. The bulk of the book includes descriptions of families, keys to genera, in some, keys to species, descriptions of species with much information on distinctive features, habitats, distribution uses of plants by the pioneers and Indians, and excellent photographs of about five hundred species. Although some of the nomenclature is outdated, the book remains the best of its kind.

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ANATOMY OF THE MONOCOTYLEDONS. 1. Gramineae. Metcalfe, C. R. 731 pages, illustrated, indexed. Oxford University Press, New York. 1960. $13.45.

Several years ago Dr. Metcalfe and his colleague Dr. Chalk published a massive two-volume work, *Anatomy of the Dicotyledons*, which immediately became the standard reference work in its field. Now Dr. Metcalfe brings us the first volume of the companion work, *Anatomy of the Monocotyledons*. This volume deals solely with the grasses. The general plan and presentation of the work, with an alphabetical arrangement by genus and species, will be familiar to those who have used the volumes on the dicotyledons. The present volume differs from its predecessors, however, in that most of the information presented represents original study by the author. The previous literature is not neglected, but it seems minor in comparison with Dr. Metcalfe's own work.

This volume is especially timely because of the existing ferment among agrostologists as to the major taxonomic organization of the grasses. It is evident that the traditional tribes familiar to those of us who grew up on Hitchcock's *Manual of the Grasses of the United States* will have to be completely recast, and that anatomical characters will be highly important in arriving at a new scheme. Dr. Metcalfe has examined species representing more than two hundred different genera, and he has taken particular pains to include the anatomical information now thought to be taxonomically significant. When the literature abstracts are added, the number of genera treated rises to three hundred and forty-five out of a total of about five hundred in the family. The taxonomic notes accompanying the anatomical data are especially valuable, because they were prepared in consultation with the renowned agrostologist C. E. Hubbard.

No work can be perfect, but whatever flaws there may be in this one do not present themselves to my attention. It will be the basic reference work in its field for decades to come.

ARTHUR CRONQUIST

TROPICAL AND SUBTROPICAL AGRICULTURE. Ochse, J. J., M. J. Soule, Jr., M. J. Dijkman, and C. Wehlburg. 2 Vol. 1446 pages, illustrated, indexed. The MacMillan Co., New York. 1961. $35.00.

This work is organized in two parts: Part I, a general discussion of some basic factors in farming, and Part II, Crops, a discussion of selected crops raised in tropical and subtropical areas. The first six chapters cover climate, soil, soil fertility, and cultural practices; chapters seven to fourteen are entitled "bananas and citrus," "other fruit crops," "spices," "beverages—coffee, cacao, tea," "rubber and cinchona," "oil crops," "fiber crops," and "sugar cane and other field crops." Two of the authors, Ochse and Dijkman, are members of the botany department of the University of Miami, and Soule and Wehlburg are members of the University of Florida; Soule at Gainesville, and Wehlburg at Belle Glade Everglades Experiment Station.

The book is fairly adequately illustrated with tables, line drawings, and quite a number of good photographs. There is an extensive bibliography provided for each of the sections, but it is misleading to say that the size of the bibliographies makes them adequate. The latest figures on productivity of various crops is that provided from the *Yearbook of Food and Agricultural Statistics*, 1956, FAO. Most of the citations are from much earlier works, and it seems that the major amount of work on these two volumes stopped about 1954. Certainly there have been more recent publications which would have given more soundness to the work, if there had been an adequate search made. Another problem is that a large number of the cited works are in Dutch, a language that is not too widely used by those to whom this book should be of the greatest value—people in the tropics and subtropics.

There is definitely a need for a general work covering the topic given in the title. Unfortunately, the need still remains, for the title is misleading—there is no discussion of animals in these volumes. Furthermore, there should have been a subtitle: selected crops of economic importance to temperate-zone commerce. Then there should have been further restrictions made, or perhaps exceptions is the better word, for the authors have included in the section "other fruit crops" a large number of fruits that are barely at the level of economic productivity. Some of these fruits are quite interesting, and probably are abundant in some section of the world or other, but have yet to be accepted by a wide public.

It is quite obvious that the authors had their eyes on those crops that have had the greatest amount of exploitation in the plantation-type agriculture of earlier years, as they have ignored some of the more fundamental crops for

(Continued on page 40)

NEWS, NOTES and COMMENTS

Activities of the Director and Staff. Within the past several months Dr. William C. Steere, Director, attended a meeting concerned with National Science Foundation postdoctoral fellowships in Washington, D. C.; the annual meeting of the Trustees of *Biological Abstracts* in Philadelphia; meetings of the Board of Directors of the Horticultural Society of New York in New York City, of the Executive Committee of the Biological Sciences Curriculum Study and of the Steering Committee of the Biological Sciences Communications Project in Chicago, of the Executive Committee of the American Institute of Biological Sciences and of the Planning Committee of the Conference of Biological Editors in Washington, D. C., and of Commissioner Allen's Committee on Museum Resources in New York City; and addressed the Little Gardens Club of New York City and the Men's Garden Club of New York.

T. H. Everett, Assistant Director (Horticulture) and Senior Curator of Education, spent two days at the Denver Botanic Garden as consultant, to advise on a building program for new conservatories.

Dr. H. W. Rickett, Bibliographer and Senior Curator of the Library, is a member of the Advisory Committee of the Rachel McMasters Miller Hunt Botanical Library.

Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Botany, spent a day at the National Science Foundation in Washington, D. C., in consultation with Dr. David D. Keck, Program Director for Systematic Biology, among others, on Garden affairs.

Dr. P. P. Pirone, Senior Plant Pathologist, gave a talk before the Westchester County Tree Protective Association in White Plains, New York.

Dr. David J. Rogers, Curator of Economic Botany, attended the Eighth Annual Symposium on systematics. The subject of this year's symposium, sponsored by the National Science Foundation at the Missouri Botanical Garden, St. Louis, was "The Population Concept in Systematics." Dr. Rogers will leave the first week in January, 1962, for two-months field work on *Manihot esculenta* and allied species in Bolivia and Peru under a National Science Foundation grant. He will be accompanied by an assistant, Fred Olday, who as a senior at Penn State University is majoring in systematic botany.

Dr. Caroline K. Allen, Research Associate, has received a grant of $1,500 from the American Philosophical Society toward field observations on controversial genera of the *Lauraceae* in Venezuela and Surinam during the spring and early summer of 1962.

Elizabeth C. Hall, Sarah Gildersleeve Fife Research Librarian, attended a meeting of the Men's Garden Club of New York, at which the "Garden Pants" award was presented to Mrs. Richard Gonzales of Rye, New York. This is an annual "woman of the year" award, and previous recipients have been Miss Hall and Dr. Cynthia Westcott. Mrs. Gonzales is a member of the Corporation of The New York Botanical Garden.

Dr. Richard M. Klein, Alfred H. Caspary Curator, and Mrs. Klein, as co-authors, presented a paper entitled "Interaction of Ionizing and Visible Radiation on Mutations in *Neurospora crassa*" at a meeting of the American Society of Cell Biology in Chicago. Mrs. Klein is professionally Dr. Deana T. Klein, instructor in microbiology at the Albert Einstein College of Medicine in New York City. Dr. Elsa H. J. O'Donnell, Visiting Research Associate, also presented a paper at this meeting, entitled "Feulgen Positive Fractions in the Nucleolus."

Dr. Alma Barksdale, Senior Research Associate, is being assisted by Gordon Werner in her research on *Achlya* under a grant from the National Science Foundation.

Staff Seminar. Dr. Pierre Dansereau, Assistant Director (Botany) and Senior Curator, addressed the staff seminar in November: his topic, "Universal Implications in New Zealand Vegetation Problems." At the December Seminar Dr. Max Milner, Senior Food Technologist, Food Conservation Division, UNICEF, discussed "The U. N.'s Efforts in the World Protein Shortage." A special seminar was held on November 28, 1961, when Torkel Korling, artist and professional photographer of Chicago, described and illustrated some of his works on wild flowers.

The Advisory Council, of which Mrs. John E. Parsons is Chairman, made a gift to The New York Botanical Garden of eight thousand dollars for the purchase of equipment to be used by the Gardening Department to mechanize more fully lawn preparation and maintenance.

The Volunteer Associates of The New York Botanical Garden sponsored and arranged for the sale of bulbs to members of the Garden, the proceeds of which will be used for the Garden's programs of education, exploration, and research. Over two hundred and fifty members availed themselves of this opportunity to obtain fine bulbs for their spring gardens and to support this fund-raising project.

'Geranium' was the favorite variety of narcissi, with 'King Alfred' and 'Magnificence' vying as second and third choices, and 'Beersheeba' and 'Fortune' following them closely as fourth and fifth choices. 'Zwanenburg' and 'Pride of Zwanenburg' led the tulips with the old variety 'Clara Butt' still continuing as a favored third; 'Princess Elizabeth', 'Glacier', and 'Blue Aimable' running fourth, fifth, and sixth. Red is evidently a well-liked color, for *Tulipa fosteriana* 'Red Matador' and Darwin Hybrid 'Red Matador' were the favorites in this particular group. All told, more than three thousand hyacinths, twenty-three thousand tulips, twenty-two thousand narcissi, and twenty-four thousand miscellaneous bulbs were ordered.

The Botanical Review, one of the most important botanical publications, has been presented to the Garden by Dr. Edmund H. Fulling, Honorary Curator. The Review was founded by Dr. Fulling and Dr. Henry A. Gleason, Head Curator Emeritus, in 1935 and ever since then has been managed edited, and published at The New York Botanical Garden by Dr. Fulling. Dr. Fulling will continue as Editor of this publication. In July, 1957, Dr. Fulling turned over *Economic Botany,* of which he had been editor and publisher from 1947, to the Garden.

Visitors to the Garden Within Recent Months.

J. W. Parham, Botanist of the Department of Agriculture, Suva, Fiji.

Dr. Horace Wester, Plant Pathologist, National Capital Parks, Washington, D. C.

Dr. F. A. Stafleu, University of Utrecht, Utrecht, The Netherlands.

Charles Rohr, Lancaster Press, Lancaster, Penn.

Dr. Harvey Miller, Miami University, Oxford, Ohio.

Dr. Edmund Bonner, Curator of Conservatoire Botanique, Geneva, Switzerland.

Dr. Elva Lawton, University of Washington, Seattle.

Dr. M. A. Jayaneera, Director of the Royal Botanic Gardens, and Mrs. Jayaneera, Piradeniya, Ceylon.

Dr. William Chaloner, University College, London, England.

Dr. Lloyd V. Edington, Connecticut Agricultural Experiment Station, Storrs, Conn.

G. Saaltink, Laboratorie Fytopathologie, Wageningen, Holland.

Albert Matta, Instituto Pathologie Vegetale, Turin, Italy.

Dr. Wilhelm D. Margadant, Assistant Librarian, Hunt Botanical Library, Pittsburgh.

Dr. Wolfgang Maas, Dalhousie University, Halifax, Nova Scotia.

Dr. H. A. McCullough, Howard College, Birmingham, Ala.

Dr. G. W. Martin, Professor Emeritus, State University of Iowa, Iowa City.

Dr. R. Imazeki, Forest Experiment Station, Meguro, Tokyo, Japan.

Dr. T. Sasaki Faculty of Agriculture, University of Tokyo, Japan.

Dr. George Bove, Boyce Thompson Institute for Plant Research, Yonkers, N. Y.

Dr. Frederika Quak, Wageningen, Holland.

C. B. Borden, Department of Geography, Columbia University, New York.

Ellis Etter, Cleveland, Ohio.

Dr. Arturo Roque, Director, Agricultural Experiment Station, Puerto Rico.

William E. Hartnoll, Garden Editor, *The Telegram,* Toronto, Ont. Canada.

Retirement and Anniversary Gifts were presented by Dr. William C. Steere, Director, to several employees at the Christmas party on December 20, 1961. This is an annual affair tendered by the Board of Managers to all employees of The New York Botanical Garden.

Nicholas Tagarelli, who will retire on April 1, 1962, after thirty years service, and Elmer N. Mitchell, who has been Staff Photographer for eighteen years and whose retirement is effective January 1, 1962, received retirement gifts.

Anniversary gifts were presented to the following: in the fifty-year group, Roland Wills; in the forty-year group, Henry de la Montagne and Michael Tenore; in the thirty-five-year group, John Borin, Edward Whitford, and Lillian Weber; in the thirty-year group, Edward J. Alexander, Edward Maroney, George Moran, Alletta G. Fredericks, John Diver, Percy Diver, Earle Dugan, Roland Wills, Jr., and Andrew Ross; and in the twenty-five-year group, T. H. Everett, Frank De Genova, Edward J. Countey, and Eileen M. Kene.

Dahlia Named for Dr. Pirone. A new variety, originated by the Albert Parrella Gardens of New York City, has been named for Dr. P. P. Pirone, Senior Plant Pathologist at The New York Botanical Garden. This dahlia, a large formal decorative, has a cherry-red flower with darker tone at the center and yellow flecks at the tips of the petals.

Dr. Walter H. Hodges, who for six years was Director of Education at Longwood Gardens, Kennett Square, Pennsylvania, on November 1, 1961 assumed his duties as consultant in tropical botany with the Division of Biology and Medicine of the National Science Foundation in Washington D. C.

Carl F. Wedell of West Islip, Long Island, who from 1937 to 1958 was Dean of the School of Horticulture at the State University Agricultural and Technical Institute at Farmingdale, Long Island, was presented with the insignia of Officer in the Order of Orange-Nassau at a luncheon during the Sixteenth American Horticultural Congress at Northampton, Massachusetts, in October, 1961. B. J. Slingenberg, The Netherlands Consul General in New York, made the presentation on behalf of Her Majesty Queen Juliana who conferred the Order of Orange-Nassau on Mr. Wedell for his services as Director General of the United States Exhibition at the 1960 International Horticultural Exposition in Rotterdam.

Dr. Albert F. Yeager, internationally known for his research on fruits, vegetables, and ornamentals, died on November 4, 1961, at Fort Myers, Florida, at the age of sixty-nine. He was especially concerned with breeding varieties adaptable to cold climates. Dr. Yeager had been Chairman of the Department of Horticulture of the University of New Hampshire for twenty years at the time of his retirement in September, 1959. For the past two years he had been associated with Henry A. Wallace in horticultural research. Previously he had been a member of the faculties of Michigan State University, North Dakota Agriculture College, and Penn State University.

In 1954, Dr. Yeager received the Stevenson Memorial Gold Medal, the second American to receive this Canadian honor for "conspicuous achievement in practical horticulture." He received the Wilder Medal of the American Pomological Society in 1957.

Gazania Fire Emerald strain.

Two water-lilies have been developed by Charles Brosius Thomas, whose special interest is aquatic gardening. One, a deep red, is named 'Louise' after his grandmother; the second, which has a large star-shaped, white flower, is named 'Virginia' in honor of his mother Virginia Louise Brosius Thomas. Plant patents have been applied for for these new hybrid water-lilies that are being introduced by Three Springs Fisheries, Lilypons, Maryland. Mr. Thomas, a 1957 graduate of The University of Maryland, has been associated with Three Springs Fisheries since his teens, except for the period he spent in the service.

Gazania, a South African genus of the Composite Family, is little known in the eastern United States, but it is easily grown. The seeds may be sown in the garden or started indoors and the seedlings transplanted outdoors at a later date. This composite needs full sun and good drainage, is drought-resistant, and thrives on summer heat.

An English horticulturist, working for some years with *Gazania,* has developed a strain, Fire Emerald, that is being offered for the first time to American gardeners by Geo. W. Park Seed Co., of Greenwood, South Carolina.

Another English introduction, available from this seed company, is the bean 'Hammond's Dwarf Scarlet.' It yields a fine crop, but the scarlet-red flowers, held well above the dark green foliage and borne over a long period, are so attractive that it is being grown as an ornamental as well as a flavorful food plant.

Correspondence Course in Rhodendrons, Azaleas, and Related Plants is offered by Penn State University. The course of four lessons deals with varietal differences and cultural needs and is designed to aid the home gardener in selecting suitable kinds and in using them effectively in landscaping.

Another correspondence course is offered in Plant Propagation. The ten lessons cover fruit and nut trees, forest and ornamental trees, shrubs and vines, annuals, biennials and perennials.

These lessons are obtained from Correspondence Courses, 202 Agricultural Education Building, University Park, Pa. The registration fee for the course on Rhododendrons, Azaleas, and Related Plants is $1.00; for the course on Propagation of Plants $2.50.

Bean 'Hammond's Dwarf Scarlet'.

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A descriptive catalogue on all the seventy correspondence courses is available from the above address.

"Fairyland of Flowers," a 16-mm sound motion picture in color, was shown at a special preview for horticultural experts and the press on November 28, 1961, by the Belgium Tourist Bureau. The film, produced by the Belgian Begonia Growers Association, portrays the beauty of Ghent and the surrounding towns, as well as sequences on hybridization, planting, growing, and harvesting begonias. The film may be had for showing before garden clubs and other groups by writing to the Belgian Begonia Growers Association, Room 607, New York 17, N. Y.

BOOK REVIEWS (Continued from page 37)

the people in the tropics themselves. Why leave out the root crops? I can find no excuse for the omission of yams, sweet potatoes, manioc, taro, and Irish potatoes when discussing tropical agriculture. Furthermore, the emphasis on sugar cane is far greater than on corn, an apparent reflection of some bias.

In the section on Crop Improvement on pp. 316 ff., the authors have reflected some ideas of Vavilov concerning the origins of cultivated plants and have not made any modification based on later work. (See Harlan, J. in AAAS Symposium, Chicago, 1959). The failure to mention cytoplasmic male sterility in crop breeding is a reflection of the early closing of literature search, and the reader should not be misled to believe that the discussions are of the latest available information.

All in all, the work has a factual basis for the material covered. There is no evidence of misinterpretation of the literature cited. One who wishes to have some description of the plants discussed, without knowing all the latest developments concerning these crops, may read this book with satisfaction.

DAVID J. ROGERS

CHEMICALS IN YOUR FOOD. Bicknell, Franklin. 192 pages, indexed. Emerson Books, Inc., New York. 1960. $2.95.

This interesting little book should be widely read, if only to make more people aware of the implications of food additives. The problem is stated in a perhaps oversimplified, but nevertheless striking way in Bicknell's introduction. "The United States leads the civilized world in chemicalized food and in degenerative diseases."

In general, food additives (including agricultural chemicals which get into foods) are discussed from the points of view of the purpose for which they are added, the type of chemical they represent, and the potential health hazard with which they may be associated. Some of the discussion of harmful effects is frankly speculative, but most is documented (291 references). A useful appendix gives the chemical formulae of many commonly used additives.

Much of the author's attitude toward the use of additives is expressed in a sentence of his discussion of artificially colored foods. "While it is possible to show a dye is dangerous, it is impossible to show it is safe."

MARJORIE ANCHEL

FLORA OF NEW ZEALAND. Allan, H. H. 1085 pages, 40 text figures, 4 maps, indexed. R. E. Owen, Government Printer, Wellington, New Zealand. 1961. $14.75.

The first volume of this long-awaited flora treats all vascular plants, except the monocotyledons, indigenous to the New Zealand Islands lying within 29°-55° South latitude and 158° East-176° West longitude (Norfolk and Lord Howe Islands excluded). It covers 116 families, 290 genera, 145 species, and 280 distinct varieties.

This very comprehensive work by Dr. Allan was to have been a second revision of the *Manual of the New Zealand Flora* by T. F. Cheeseman but, according to the preface, a completely new flora was deemed essential. At Dr. Allan's death in 1957, Lucy B. Moore, who had worked closely with him since 1953, continued the research and capably carried the work to completion.

The rather unusual presentation of the flora warrants comment. The preface, in addition to a discussion of scope, abbreviations, and the like, contains an extensive bibliography in chronological sequence from 1769 to 1958, and a list of authors with dates (birth and death), their country of origin, and/or scene of work.

Original citation of species with significant synonymy is included in the text. An ample description follows the general distribution of each species in the New Zealand area, with habitat, flowering and fruiting dates, type locality and type collection cited. Frequently, lengthy discussions are added concerning variation within the taxa and nomenclatural problems, as well as notes on genetics, polymorphy, and hybridism. New taxa appearing in the text are validated by Latin diagnoses at the end of the book. There is a glossary with illustrations of leaf characters; also, an alphabetical list of Maori names of plants which should be of value; and supplementary notes (additions and corrections). A full index, carrying the author's name for each entity, completes the book.

In short, the detailed treatment is reminiscent of a taxonomic monograph rather than a practical, working flora. If the objectives stated in the preface by the collaborating author are realized and production is thereby stimulated, the unusual features incorporated in this fine flora will indeed be justified.

CAROLINE K. ALLEN

THE GRASSES OF MISSOURI. Kucera, Clair L. 241 pages, illustrated, indexed. University of Missouri Press, Columbia, Mo. 1961. $4.50.

This is a standard floristic treatment, complete with keys, descriptions, and illustrations, the illustrations being mostly taken from Hitchcock's well-known *Manual of the Grasses of the United States*. The arrangement of genera and tribes is traditional, with *Lolium*, for example, being retained in the tribe *Hordeae*. In the treatment of species the author attempts to select in each instance the most acceptable treatment from the current manuals and revisionary studies, the most reliance being placed on *Manual of the Grasses* and on Gleason's *New Britton and Brown Illustrated Flora*. Synonomy is given only in connection with the frequent explanatory comments. Since there are fewer genera and species to deal with, the keys are simpler than those in Hitchcock or Gleason. Unfortunately, however, the keys are not indented, and in the reviewer's opinion all non-indented keys should be consigned to perdition. Otherwise, the book appears to be very satisfactory for the purpose for which it was designed.

ARTHUR CRONQUIST

FIELD GEOLOGY. Lahee, Frederic H. xxxi and 926 pages, illustrated, bibliography, indexed. McGraw-Hill Book Co., Inc. New York. 1961. $10.75.

This is the edition, greatly expanded and streamlined, of a manual that has remained a "field bible" in geology, in quality never surpassed or even approached. Its twenty-three chapters with appendix comprise five hundred and seventy-five geological topics with an extensive index and an invaluable bibliography of three hundred and twenty-nine references.

Using the most recent authoritative sources, the chapters express a rapid advancement in the application of geological sciences during the past decade. New topics, especially relating to surveying, and with a vocabulary unknown only a few years ago, are treated in great detail. They incorporate the interpretation of aerial photography and the gravimetric, magnetometric, seismic, and electric methods of geophysical surveying.

A significant treatment is accorded the surface features of rocks, the structures of sedimentary formations, and their relationship to the "forces" to which they are perpetually subjected. The topic of topographic form and expression in geomorphology and physiography are afforded expansive development which leads to the interpretation of mapping and surveying, with an excellent discussion of modern tools and instruments.

The proper use of this book presupposes, more than ever, a basic knowledge of geology and its processes as well as of mathematics and physics. Although the definition of terms, the use of tables, and over six hundred figures elucidate and complement the text, the book has become less and less a work for beginners.

HERMAN F. BECKER

A BIBLIOGRAPHY OF EASTERN ASIATIC BOTANY—SUPPLEMENT I. Ed. by Walker, Egbert H. i-xl, 1-552. American Institute of Biological Sciences. 1960.

The monumental *Bibliography of Eastern Asiatic Botany*, by Elmer Drew Merrill and Egbert H. Walker, appeared in 1938. This indispensable botanical tool was reviewed by John Hendley Barnhart (Jour. N. Y. Bot. Gard. **39**:139) who said, "Rarely, indeed has a work of this kind covered its field so thoroughly and accurately." It contained some twenty thousand main entries, covering the literature of the region up to 1936.

Now we have Supplement I, compiled by Dr. Walker; this extends the coverage through 1958. It equals in size the original volume, containing 414 pages of author entries in double column; and useful indexes, regional and systematic. Japanese and Chinese names are printed both in Japanese and Chinese characters and transcribed into Roman letters; this necessitated the printing of the book in Japan and Dr. Walker's presence in Tokyo. Russian names and

titles, however, are only transliterated (and generally translated). Brief notes are given under most titles. Some older references omitted in the original volume are here picked up.

Dr. Walker deserves great praise for the completion of the task that Merrill left on his hands.

H. W. RICKETT

PROBLEMS IN PHOTOSYNTHESIS. Bladergroen, W. 197 pages, illustrated, indexed. Charles C. Thomas, Springfield, Ill. 1960. $10.50.

Dr. Bladergroen's exposition on photosynthesis is particularly useful to the biologist who wishes to broaden his general knowledge in the basic life processes. The treatise is well organized, clearly expressed, and by recapitulating some fundamental physical principles allows the non-expert to acquaint himself with recent progress in this most vital field of research. By presenting numerical examples in manometry, the author has enhanced its value as a teaching aid.

Dr. Bladergroen makes value—judgments on the validity and interpretation of the experimental results presented by diverse investigators. He strongly favors the viewpoints of Dr. Otto Warburg and castigates his detractors.

DAVID DAVIS

WEED CONTROL: As a Science. Klingman, Glenn C. 421 pages, illustrated, indexed. John Wiley and Sons, New York. 1961. $8.50.

The various aspects of weed control are ably presented in this well-written, well-illustrated book. Although prepared primarily as a classroom text, it will be helpful to farmers, highway and industrial ground maintenance crews, home owners with lawn weed and vegetable garden problems, and aquatic and recreation area directors.

P. P. PIRONE

THE CHEMISTRY AND MODE OF ACTION OF HERBICIDES. Crafts, A. S. 269 pages, illustrated, indexed. Interscience Publishers, New York. 1961. $9.00.

This book provides a comprehensive description of the more important chemicals used as herbicides, the nature of their effect on plants, and their impact on agriculture and modern urban life. It is much too technical for amateur gardeners, but should be very useful to research workers and students in the field.

P. P. PIRONE

FOLIAR FEEDING, A MILESTONE IN PLANT NUTRITION. 16 pages. Illustrated. Ra-pid-Gro Corporation. Dansville, N. Y. Sept. 1961.

Anyone who doubts that plants can be fed via their leaves should read this handsome, 16 page brochure which presents the testimony given by Dr. H. B. Tukey, head of Michigan State University's horticulture department before the Subcommittee on Research and Development of the Joint Congressional Committee on Atomic Energy in Washington in 1954. The more important points in Dr. Tukey's testimony are underscored by the brochure's editor and special notations and drawings are made in the margins to further emphasize these points. A bibliography of 42 papers on the subject is appended. Also included is a facsimile of the citation given by the American Horticultural Council to Mr. Thomas Reilly in 1959 for his Pioneer and development work in foliar feeding. Copies may be obtained by writing to the Ra-pid-gro Corporation, Dansville, N. Y.

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PLANT PHYSIOLOGY. A Treatise. Volume 1A. Cellular Organization and Respiration. F. C. Steward, Editor. xxvii + 331 pp. Illustrated. Academic Press, New York. 1960. $13.00.

Volume 1A of this "treatise" of plant physiology is a graft chimera consisting of two excellent chapters on enzymology and respiration and one on the microscopic and sub-microscopic organization of the plant cell. The chapters under review are neither comprehensive (although the literature cited is fairly extensive) nor are they textbook material. Topical reviews are necessary at frequent intervals for the research scientist and are available in the various "Annual Reviews." Textbook material is, unfortunately, less available and, as is true here, is usually out-of-date before the volume is published. One can predict that a treatise such as this will be a library item, rather than either a working reference book or a text, and will be most useful for the college-level teacher. Such a view is reinforced by the very high price of the entire set or even of the individual volumes.

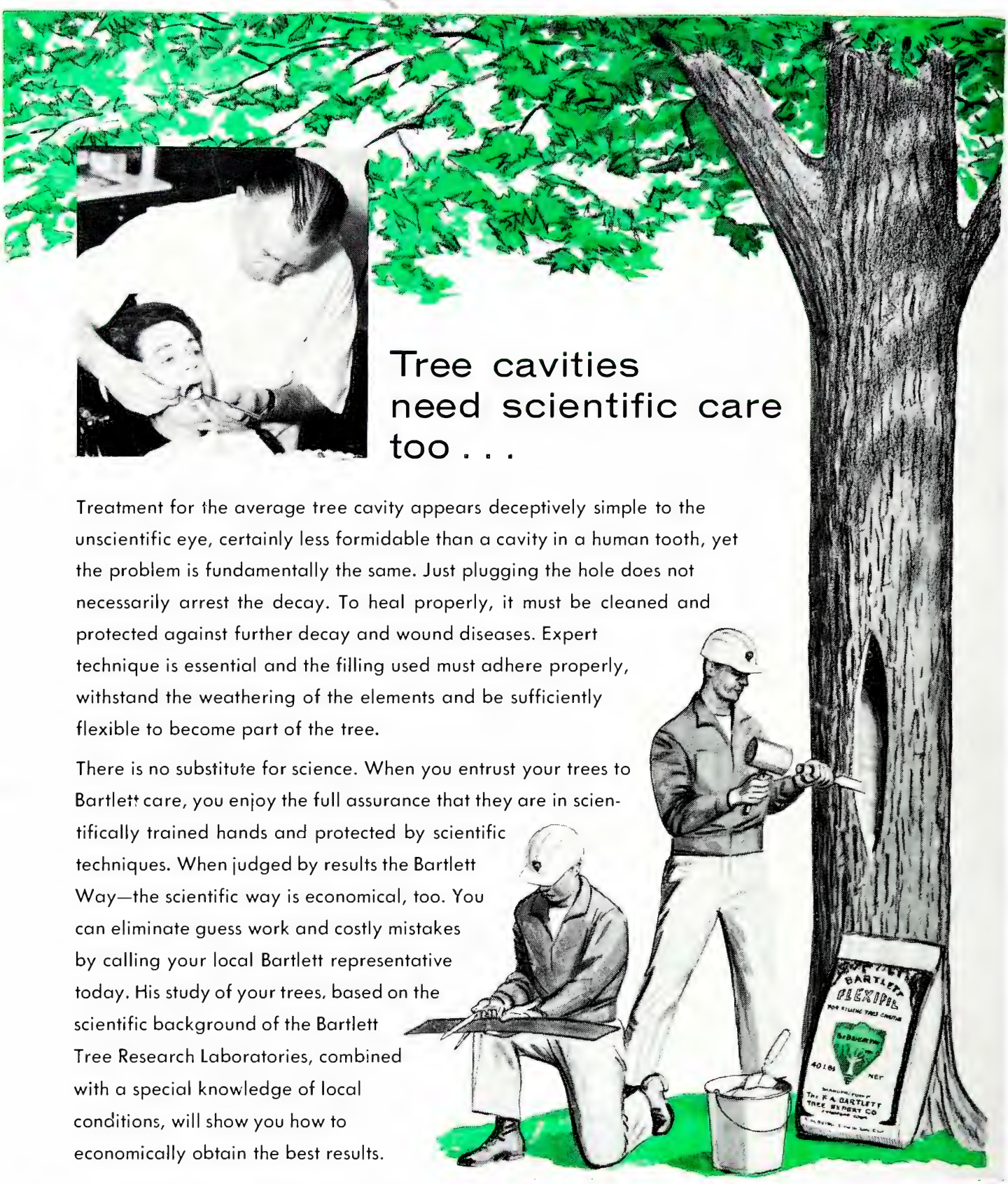
The three chapters in this volume are written by recognized authorities and are excellent. Illustrations are adequate for the purposes intended and bindings and printing cannot be faulted. The discussions of the structure of cell organelles are somewhat superficial and relate poorly to the subsequent information on function. Thus, less than four pages are devoted to both mitochondria and microsomes, the structural sites of enzyme reactions and protein synthesis. Variations in literary styles among chapters is undoubtedly unavoidable, but tends to disrupt the reader.

RICHARD M. KLEIN

WALTER EGLER (Continued from page 29)

parts. Dr. Egler and Dr. Irwin undertook to survey the Rio Jarí; Dr. Pires and Gary Irvine of The New York Botanical Garden undertook the survey of the Rio Araguari. This second expedition has just concluded, and Mr. Irvine is at this writing en route to New York. It was on the first and more difficult operation that Dr. Egler lost his life, bringing to such an early close the life of a fine man, a thorough scholar, and an imaginative administrator. The Brazilian community and the botanical world have suffered a grievous loss.

The bold and significant plans designed by Dr. Egler will not end here. Only during the past week in New York Dr. Djalma Batista, Director of the Conselho Pesquisas for Amazonas, Dr. Irwin, and I planned the conclusion (together with the participation of Dr. Pires), of the work on the Jari, the completion of the investigation of coastal Amapá, and long-term survey throughout the Amazon Basin.



Tree cavities need scientific care too . . .

Treatment for the average tree cavity appears deceptively simple to the unscientific eye, certainly less formidable than a cavity in a human tooth, yet the problem is fundamentally the same. Just plugging the hole does not necessarily arrest the decay. To heal properly, it must be cleaned and protected against further decay and wound diseases. Expert technique is essential and the filling used must adhere properly, withstand the weathering of the elements and be sufficiently flexible to become part of the tree.

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THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

Vol. 12, No. 2 March-April 1962

THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

DOROTHY EBEL HANSELL
Editor

CALENDAR

April 4, 1962. Members' Evening of The New York Botanical Garden, Essex House, New York, N. Y.

April 8-11 1962. Seventeenth Annual Horticultural Congress, Norfolk, Va. Headquarters: The Golden Triangle Motor Hotel.

April 13, 1962. Opening of Easter Show in the Conservatory of The New York Botanical Garden—"Tuliptime," featuring a canal and facsimile of Dutch bulb fields.

April 21-28, 1962. Historic Garden Week in Virginia, sponsored by The Garden Club of Virginia. Proceeds devoted to the restoration of grounds and gardens of historic shrines in Virginia of national importance. For information, write Room 3, Mezzanine, Hotel Jefferson, Richmond 19, Va.

April 27-May 7, 1962. Floralies, International Horticultural Exposition under auspices of Société d' Horticulture and Jardin Populaires de France in Valenciennes, France.

April 28-29, 1962. Louisiana Festival of Roses, sponsored by The Louisiana Garden Club Federation, at Hodges Gardens near Many, Louisiana. Note change in dates.

May 1 and 2, 1962. "Tally-ho"—tour and show of The Garden Club of New Jersey (Bedminster-Peapack-Gladstone area).

May 7-8, 1962. Annual Meeting of American Rhododendron Society at Winterthur, Del., and Longwood Gardens, Kennett Square, Pa.

May 12, 1962, 2-5 p.m. Eastern Iris Show under auspices of Median Iris Society, affiliated with American Iris Society, in the Snuff Mill of The New York Botanical Garden.

May 14-16, 1962. Annual meeting of the Herb Society of America at Washington, D. C.; headquarters, Marriott Hotel. Hostess—The Member-at-Large Unit of the Society; Mrs. S. J. Neiburg, Paxton, Ill., Chairman.

May 16, 1962. Spring Garden Tour to Greenwich, Conn., sponsored by the Volunteer Associates of The New York Botanical Garden.

May 17, 1962. Ninth Annual House and Garden Tour, benefiting the Institute of Physical Medicine and Rehabilitation of New York University Medical Center, in Westchester County, N. Y., and Connecticut.

May 22, 1962. Annual Meeting of The New York Botanical Garden.

May 25, 1962. Garden Writers' Day at The New York Botanical Garden.

June 6, 1962. Twentieth Annual Rose Day at The New York Botanical Garden.

August 31-September 8, 1962. Sixteenth International Horticultural Congress, Brussels, Belgium.

March 19-20, 1963. International Flower Show, City Hall, Cape Town, celebrating the "Golden Jubilee" of the National Botanic Gardens of South Africa, Kirstenbosch.

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CREDITS FOR ILLUSTRATIONS

We are indebted to the Display Committee, Mrs. Charles Burlingham, Chairman, for the selection of the front cover illustration—spring beauty (**Claytonia virginica**) covering the ground at the foot of an old beech at The New York Botanical Garden, photo taken by Gottscho-Schleisner, May 16, 1961; p. 42, Dr. H. M. Cathey, U.S.D.A. photo; p. 43, E. N. Mitchell; pp. 44, 45, Edward H. Scanlon & Associates; pp. 47, 48, Bernice Brilmayer; pp. 49-51, Edmund B. Gilchrist, Jr.—courtesy Ernesta Drinker Ballard; p. 52, upper, p. 54, lower, Charles C. Clare, Jr.; p. 52, lower, p. 53, p. 54, upper two, Clark T. Rogerson; pp. 56-58, Pierre Dansereau; pp. 59-63, Botanic Gardens, Singapore; pp. 66, Fred V. Grau; p. 70, Otto Penner; p. 71, Herman F. Becker.

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WHAT'S NEW IN GARDENING – PESTICIDES and PLANTS

By P. P. Pirone

The following is based on the talk that Dr. Pirone, Senior Plant Pathologist of The New York Botanical Garden, gave during the Downtown Lecture Series, sponsored by the Volunteer Associates, in January, 1962.

One of the most difficult decisions I had to make in preparing this talk was to decide how new is new, and how old something must be before it is no longer new.

If I were to discuss only the plants or gardening aids introduced within the past year, I'm afraid I would be including many that might not be around a year from now. And if I were to limit the time of introduction to a year, I would be remiss in not telling you about many valuable aids introduced within the past several years, or even longer, that have already found an important place in gardening.

Another difficulty in discussing new things is that no one can forecast how successful the product or plant will be. We all recall, I am sure, the great fanfare that accompanied the introduction of vitamins for plants, the synthetic soil conditioners, and the growth-promoting substances like gibberellic acid. I was one who thought that at least some of these materials would be around for a long while. Yet except for highly specialized and very limited uses, these products have all but disappeared from the market. A few, like the growth-retarding substance maleic hydrazide, are being revived because further research has uncovered reasons for their earlier erratic behavior.

And so I decided to tell you not only about some of the newer introductions, but also about some of the dependable older ones.

Plant Nutrition

Research in the field of plant nutrition has discovered a new kind of plant food, which differs considerably from the older ones. This year a magnesium–ammonium phosphate fertilizer, containing eight per cent nitrogen, forty per cent phosphate, and twenty-four per cent magnesium oxide (8-40-0) is being introduced. It contains no potassium—apparently the magnesium oxide replaces this ingredient. The principal advantage of this mixture is that it will not burn roots or leaves, and seeds sown in it will germinate without harm. Tree seedlings, turfgrasses, shrubs, and other ornamental plants should benefit greatly from this new combination.

Weed Killers

Each year new crabgrass-controlling materials are introduced. Some are decidedly more effective than older ones, others are not. Two years ago, two highly effective pre-emergent–control materials were introduced — Dacthal and Zytron. Either of these materials, when applied as directed, is capable of preventing the germination of crabgrass seed. Nearly one hundred per cent control of crabgrass is possible under ideal conditions.

These pre-emergent–control materials, however, will also inhibit the germination of desirable grass seeds. Hence new lawns cannot be seeded until the active ingredients have been dissipated. This may mean a wait of several months between treatment and seeding. But these materials can be used on established lawns with excellent results.

Last year two new crabgrass-controlling substances were made available—calcium propyl arsonate and diphenatrile. The former is said to kill crabgrass seed without interfering with the germination of seeds of desirable grasses. The latter is said to be so safe on desirable plants that it can be used to control crabgrass in flower beds and similar non-lawn areas. Tests with both materials, however, have not been consistent. Perhaps additional research is needed, before they are released to the general public.

Poison ivy, Japanese honeysuckle, and chrysanthemum weed or mugwort *(Artemisia vulgaris)* are just a few of the noxious weeds controllable with amino triazole. This non-arsenical weed-killer does not persist in the soil for long; hence desirable plants can be grown safely a few weeks after the weeds are killed. Amino triazole works by interfering with the formation of chlorophyll in the leaves, a process that is vital to all green plants.

Caution must be practiced in using this material, because it will kill such desirable plants as lilacs, privet, and roses if any is sprayed on their leaves. Amino triazole is non-toxic to people and pets, when used as directed, and is non-corrosive to spray equipment.

Veronica filiformis, a tiny creeper with pale blue flowers, is becoming a serious pest in lawns. It can be controlled by spraying with endothol, a material sold under the name of "Endothol Turf Herbicide."

"X-All" is a general weed-killer for driveways, patios, tennis courts, stone walls, fence rows, and so on. It will control all weeds and grasses for a whole season without endangering pets or children, and is easy and pleasant to use.

Plant Disease Control

The Dutch elm disease continues to destroy thousands of fine old elms in this country each year. Heretofore, spraying with an insecticide to control the insects that spread the disease was done in early spring before buds opened and well before the insect vectors emerged from their breeding places.

Dr. R. R Whitten of the United States Department of Agriculture recently reported that a single spraying in the fall with either DDT or methoxychlor protects trees throughout the following spring and early summer, when trees are most susceptible to infection. Dr. Whitten warns, however, that the success of the single spraying depends on the right combination of materials, equipment, methods, and time.

To my knowledge, no chemical has been discovered that will control the disease in an already infected tree, or that

The dwarfing effect of phosfon is clearly demonstrated by the three plants on the right. The clay pots in which these chrysanthemums were grown were dipped for five seconds in 10, 100, and 1,000 parts per million (left to right) of phosfon; then untreated soil and cuttings were placed in them. The plant on the left was grown in an untreated pot.

will definitely prevent infection in any tree. This is contrary to some of the publicity you may have read in the past year.

Fungi and insects continue to be the major limiting factors in successful rose culture. Investigators at the United States Department of Agriculture have recently put together some old and some new ingredients to make one of the most effective combination sprays yet devised. Here is the formula for one gallon of this mixture, sufficient to spray about twenty rose bushes.

A. 25 per cent wettable lindane powder	3 teaspoons
B. 50 per cent wettable DDT powder	5 teaspoons
C. 15 per cent wettable Aramite powder	4 teaspoons
D. 75 per cent wettable Phaltan powder	4½ teaspoons
Water	1 gallon

A and B will control all chewing and sucking insects; C will control spider mites; and D will control fungus diseases, such as mildew and black spot. Some of D's predecessors, as ferbam and captan, gave good control of black spot but were ineffective against mildew.

Insects and Insecticides

The Japanese beetle, a pest in the eastern United States, was found in Sacramento, California, in early June of last year. Those of us who have lived with this pest over the years can well appreciate the concern caused by its appearance in one of our most important agricultural states. "Sevin" is the trade name of a new insecticide that is unusually effective against Japanese beetles, tent caterpillars, and the Mexican bean beetle.

The scale insect *Fiorinia externa* has become a serious pest of hemlocks in the northern United States. It is more difficult to control than most scale insects, because the adult females continue to produce and protect their young (crawlers) over a long period. This necessitates three widely spaced sprays for control. The first must be applied just before new growth starts in the spring. It is prepared by mixing one cup of a Superior dormant oil and four tablespoons of fifty per cent malathion in three gallons of water. For large-scale use, one gallon of oil and one pint of malathion are mixed in fifty gallons of water.

The second application in early May should contain two tablespoons of fifty per cent malathion and two of twenty-five per cent emulsifiable DDT in three gallons of water. One pint of malathion and one pint of DDT should be used in fifty gallons of water. The third application, containing the same ingredients as the second, should be applied in September.

Dieldrin remains one of the best killers of soil-borne insects such as Japanese beetle grubs, sod-web worms, army

The soil in which poinsettia 'Barbara Ecks', on the right, was grown, received 0.4 gram of C C C. The same variety, on the left, was grown in the usual way.

worms, and cutworms and it is effective over longer periods than most others. Chinch bugs (in lawns) that have become resistant to DDT and chlordane can be controlled by the material known as "Diazinon." Research workers, by the way, have recently developed a DDT against which insects cannot build up a resistance.

Thuricide, a new insecticide prepared from a bacterium, *Bacillus thuringiensis,* shows great promise in controlling leaf-feeding insects, such as horn worms and army worms. Each ounce of this microbial insecticide contains over eighty billion viable spores of the bacterium. Three large-scale forest tests in Vermont last year showed that gypsy moth larvae could be controlled with an airplane application of two to four pounds per acre. Stauffer Chemical Company of New York is marketing this material under the name "Stauffer Thuricide Wettable Powder," while Rohm and Haas Company of Philadelphia is selling it under the name "Bacthane L69."

Other Pests

A new approach to the control of mites, which are among the most destructive garden pests, involves the use of materials that literally cause the mites to explode. When either of two cellulose derivatives, sold under the names "Cellosize" and "Methocel," is sprayed on mite-infested plants, the mites actually burst open and die. Just how these products work is not yet known.

"Snake-Stop" is a new product developed by Dr. James H. Jenkins, Profesor of Wildlife Management at the University of Georgia. Snakes will not stay in an area properly treated with this material. It repels all kinds of snakes, and provides protection from them for about a month.

Other Gardening Aids

When branches are removed for any reason, the exposed surface on the tree should be treated with a tree-paint. In the past such paints have been applied with a brush, which meant either cleaning or discarding the brush after use. Now the job is simplified by the use of aerosol cans containing tree-paint. All one needs to do is to press the button on the can to release the paint, and the exposed surface is properly protected. Three concerns that package tree-paints in aerosol cans are: Boyle-Midway, Cranford, New Jersey, E. I. du Pont de Nemours Co., Wilmington, Delaware, and Gar-Prod. Inc., Lindenhurst, New York.

Another new product in aerosol cans is "Tree Bander Insect Barrier," introduced by the du Pont Company. When sprayed in a band on tree trunks, this material forms a sticky barrier which traps crawling insects. This is an improvement over the old sticky substances which are applied with a putty knife or similar tool.

Because their roots are difficult to store and carry through the winter months, dahlias are not so popular as they might be. Unless properly stored, the tubers will dry out and will not be usable the following year. In tests conducted at the Garden during the past several years, we found that the liquid plastic material known as "Wilt-Pruf" was very effective in reducing shriveling of dahlia tubers and canna roots. We were able to carry these dormant parts through the winter without loss. We have been told that dahlia fanciers are now successfully using this method of storing dormant tubers over winter.

Growth Retardants

In recent years a great deal of research has been conducted in the field of plant-growth retardants. There has been a special need for such materials in the culture of potted house plants. Under normal culture poinsettias, chrysanthemums, lilies, and other plants tend to grow too tall before flowering, thus becoming less attractive.

Several chemical compounds that dwarf certain plants are now available to research workers, and to florists and nurserymen. The two newest, known as phosfon and C C C,

The new dahlia 'P. P. Pirone', introduced in 1961.

when used as directed, reduce the length of stems, and this results in bushier, more desirable specimens. The effect is just the reverse of that produced by gibberellic acid. In most instances, the size of the flowers is not usually affected.

The same growth retardants have been found to initiate flower-bud development in azaleas. It is now possible, therefore, to have potted azaleas in bloom throughout the year. These are the first materials known to be capable of forcing woody plants to bud. Most of the credit for these discoveries goes to Doctors J. W. Mitchell, H. M. Cathey, P. C. Marth, and Neil Stuart, researchers in the United States Department of Agriculture.

Phosfon and C C C were also found capable of preventing salt damage to plants growing in highly saline soils. It is too early to assess the practical value of this discovery on crops growing near the ocean or in the highly saline soils of the southwestern United States.

New Plants

Each season new plants are introduced to the gardening public. Perhaps roses are most widely publicized. These and

Acer rubrum conica 'Scanlon', an upright form of the red maple, is resistant to ice and wind damage.

Left. *Fraxinus angustifolia* 'Doctor Pirone' is pyramidal, with upsweeping branches; the foliage is glossy, bright green.

other plants are tested at botanical gardens, experiment stations, and municipal and private gardens, and those that prove to be outstanding are given an All-America Award.

Last year four roses representing three major classes—hybrid tea, floribunda, and grandiflora—were named All-America winners for 1962. 'Christian Dior' with medium-large, pointed buds that open to flowers of crimson-red overlaid with irridescent scarlet, and 'King's Ransom', with long, slender, chrome-yellow buds were the two hybrid teas selected. 'John S. Armstrong', a grandiflora type, has medium-sized buds of a velvety red; these open to flowers measuring up to four inches across. The blooms retain their deep red color regardless of age. 'Golden Slippers', a sturdy and compact floribunda, has small, pointed, perfectly formed buds of bright red, orange, and gold that develop into a brilliant true orange flower.

The following are some of the other roses introduced during the year: 'Lilli Marlene', a dark cherry-red floribunda; 'Black Velvet', a deep wine-red hybrid tea, with a near-black sheen; 'Royal Lavender', a dusty lavender climber; 'Banzai', a glowing raspberry-pink hybrid tea; 'County Fair', a low-growing variety, suitable for mass plantings, with large pink flowers; 'Hybrid 311', with currant-red flowers, also suitable for mass plantings; 'Avon', a bright red with the fragrance common to old-fashioned roses; 'Peaceport', the first true sport of 'Peace', with bright salmon-pink petals and all the other characteristics of its parent, including excellent foliage and vigor; and 'Invitation', with very fragrant, double, salmon-orange flowers. A yellow floribunda, 'Girl Scout', was introduced to commemorate the fiftieth anniversary of the founding of the Girl Scout movement.

Among the annuals winning top honors last year were "Gloriosa Double Daisy"; a rose-colored sweet alyssum, 'Rosie O'Day'; and a rich coral petunia, 'Coral Satin'.

'Dr. P. P. Pirone' is a new dahlia originated by Albert Parrella, well-known dahlia grower in the Borough of the Bronx, New York City. It is cherry-red, with darker tones at the center and with the tips flecked with yellow. This new introduction is a sport of the well-known prize-winning dahlia 'Patricia Murphy'.

'Fairy Wings', a five-inch ruffled day-lily of waxy cream and pink with a green throat, won the Stout Medal, the highest award of the American Hemerocallis Society. Day-lily 'Green Valley', with frilled yellow petals, was awarded the President's Cup at the Chicago meeting of the Society last year.

Among the All-America Gladiolus Selections were 'Rusty', with chocolate-red, fluted florets formally placed on long spikes; 'China Blue', with soft blue-violet petals, deeper blue at the tips and shading into a deep violet blotch at the lower parts; and 'Gypsy Dancer', with gracefully ruffled florets of vivid scarlet-orange and a sunburst of yellow on the lower petals.

'Bonnie Marie' and 'King's Ransom' were the two camellias that won an All-America Award last year. The former bears phlox-pink flowers, four to five inches across, on bushy plants. The large leaves are glossy and rich green. 'King's Ransom' has a definite resemblance to 'Debutante', listed as one of the ten top camellias of all time. It begins

Prunus avium 'Scanlon', or 'Scanlon Globe' cherry, is an outstanding round-headed flowering tree for street planting.

to flower when 'Debutante' is almost through for the season.

Three new chrysanthemums which are highly rated are: 'Her Majesty', a white decorative; 'Apricot Sheen', a peach-gold cushion; and 'Bingo', a crimson double cushion.

A new African violet, 'Fai Lee', was awarded two blue ribbons at the national convention of the African Violet Society. Its fluffy, fully double, dark blue flowers are massed above unusually beautiful foliage.

'Miss Jekyll's White' is the name of a new, small-flowered selection of *Vinca minor alba.* This form, which literally hugs the ground, is a good choice for planting around less robust-growing spring flowers such as chionodoxas, snowdrops, and scillas.

'Dwarf Greenspike', a new arborvitae, was developed at the Oklahoma Agricultural Experiment Station. It is slow-growing and has a compact, symmetrical, pyramidal shape. Its leaves resembles the leaves of junipers but are soft to the touch and not unpleasant to handle as are those of junipers. Because of its dwarf habit, this arborvitae is useful for planter boxes as well as foundation plantings.

'Scanlon' red maple is a close upright form of the ordinary red maple, *Acer rubrum.* It holds its habit as it ages. On small properties this tree should be a useful substitute for the more difficult-to-maintain Lombardy poplars.

'Dr. Pirone' is an upright form of European ash, *Fraxinus angustfolia,* introduced by Edward Scanlon of Olmsted Falls, Ohio. It grows to about thirty-five feet and has glossy green leaves.

'Rancho Columnar' Sargent's cherry is an upright form of the well-known Sargent's flowering cherry. This tree, also introduced by Mr. Scanlon, is suggested for small properties where there is not enough space for a flowering tree of normal branch spread. 'Scanlon Globe' cherry is a round-headed flowering cherry grafted on a seven-foot standard so that it can be planted along city streets. Mr. Scanlon introduced this form from Holland.

BEGONIAS, OLD AND NEW

By BERNICE BRILMAYER

Mrs. Brilmayer enjoys her home garden and greenhouse in rural West Redding, Connecticut, where she grows a large collection of begonias. She commutes daily to New York City, as she has a full-time job as advertising copywriter; finds time to edit *The Bulletin of The Horticultural Society of New York,* and the New England edition of *Flower and Garden,* to contribute to several publications, and to write books. *All about Begonias* was published by Doubleday and Co., in 1960; *All about Vines and Hanging Baskets* in February, 1962.

SINCE THE FIRST begonias were collected in 1690, hundreds of species have been discovered, some of which have disappeared, and thousands of hybrids have come and gone. With such a large and varied genus, this is perfectly natural. We couldn't, and shouldn't, try to grow them all. Yet today, it's easy to find at least a dozen that were known more than one hundred and fifty years ago. And there are probably hundreds that have maintained their popularity for fifty years or more—that presided, in ornate jardinieres, over Victorian parlors and made farmhouse kitchens gay with color. Now they're grown for nostalgic or other reasons by casual house-plant hobbyists and dedicated collectors alike.

It's interesting to speculate on how and why these favorites have lasted so long, and on whether more recently introduced species and hybrids will enjoy comparable longevity. Certainly there is an element of chance, particularly when a plant is so new that it has not been widely disseminated and the stock can be snuffed out by several different kinds of catastrophe. Ease of culture is another factor — begonias that are satisfied with average indoor-growing conditions have the greatest life expectancy. Then there is that ephemeral quality, popular appeal — the color of a flower, the pattern or shape of a leaf, or a combination of virtues that endears a plant to everyone who sees it.

The game of guessing what makes a begonia popular is made particularly tricky by the incredibly wide variety in flower, foliage, and form. There are begonias with leaves the color of fire, masses of flowers that completely hide the foliage; with growth as tall as five feet, as small as three inches; with foliage like velvet, satin, taffeta, seersucker, brocade; with different growth-habits, creeping, climbing, hanging, standing tall and straight, or growing low and bushy. Some begonias hardly look like begonias at all.

Among today's most popular begonias, there are old-timers and newcomers of all general types. Note that these are not strictly botanical classifications — fibrous-rooted, tuberous, rhizomatous—but loose, often overlapping groups based on superficial characteristics. This is the way most amateur growers distinguish between the various types of begonias and the way most suppliers offer them. To my mind, begonias introduced as long as fifteen years ago are still "new," because the processes of propagation in quantity, and particularly of distribution, are slow.

The semperflorens, or "wax" begonias are small, bushy plants with many round, crisp, polished leaves; they are covered off and on all year with clusters of flowers in shades of red, pink, or white. The old-fashioned, single-flowering varieties are still called "America's most popular house plants" and are often used for summer bedding outdoors. Named varieties or not, the newer semi-double "thimble" or "crested" types and the fully double "rosebud" or "camellia" flowers are almost equally popular for window gardens, if not quite so indestructible.

Another widely grown group is the cane-stemmed, or "angel wing" begonias. These have tapering, wing-shaped leaves, bamboo-like stems, and branching clusters of large flowers at intervals along the stem and dripping from the tips. 'President Carnot' is a vigorous old hybrid with large satiny leaves, pointed at the edge; it begins to flower when quite small. Silvery spotted 'Corallina de Lucerna' is the one seen so often; it grows two or three feet tall and carries its long pendulous clusters of coral flowers almost constantly. Two outstanding, newer "angel wings" are of much smaller habit — 'Orange Rubra', with clean green leaves sometimes spotted, sometimes not, and glowing salmon flowers, and 'Pinafore', with very dark red-green, leathery leaves and pink flowers.

Among the hirsute or "hairy-leaved" begonias are those with leaves that may be sparsely sprinkled with soft hairs or completely upholstered with finest velvet. The flowers usually have a beard of the same or of a contrasting color on the outside. *Begonia scharffii (haageana)* is probably the best-known old-timer, with soft-velvety leaves almost fawn-colored on the upper surface, red on the reverse, and pink-hairy white flowers. Among recent hybrids, 'd'Artagnan' has heavy, hoary leaves that are curled up to reveal the red under surface; its conspicuous papery stipules are persistent. 'General Jacques' ('San Miguel') is well branched and sturdy. Its red-backed green leaves are covered with white fuzz and sometimes grow so large they need separate support.

In the oddly assorted group of "other fibrous-rooted begonias," *B. venosa,* discovered before the turn of the century, looks like and grows like a succulent. It has thick, cupped, frosted green leaves, spicy-fragrant flowers, and stems wrapped with brown tissue-paper stipules. Much newer and faster growing is *B. hispida cuculifera,* dubbed "piggy-back" begonia because of the adventitious leaflets that march up and down the leaf surface, along the veins. The foliage is sheer emerald velvet.

The large group of popular, durable rhizomatous begonias is characterized by scarred, thick, root-like stems that store up food and water against adversity and send up, in spring, foamy clusters of flowers at the top of tall stalks. The leaves may be round and flat to star-shaped; the patterns may be plain or intricate, with brightly contrasting colors; the textures may be rough, smooth, pebbly, blistered. The "lettuce-leaved" begonia 'Bunchii' is a perennial favorite; the tough, shiny green leaves are crisply frilled on the

1. *Begonia scharffii,* 2. *Begonia* 'Orange Rubra', 3. *Begonia venosa,* 4. *Begonia broweri,* 5. *Begonia* 'Bunchii', 6. *Begonia semperflorens,* and 7. Rex begonias.

edge and beefsteak-red beneath. *B. sunderbruchii* was one of the original "star-leaved" begonias, the foliage deep green, almost black, with lighter blotches.

There are so many exciting new rhizomatous begonias, it's almost impossible to predict a rosy future for just a few. The introduction of the Mexican "eyelash" species, *B. boweri,* which has lash-like black hairs around the edge of the leaf, has inspired the hybridization of some spectacularly colorful semidwarfs and dwarfs. Of these 'Maphil' ('Cleopatra') is probably the best known. The small star-shaped leaves are satiny chartreuse and chocolate in varying patterns, the showers of spring flowers like delicate pink pocketbooks. 'Ricky Minter' and 'Madame Queen' are large growers with dark, dinner-plate–sized leaves. *B. macdougalli,* with palmlike leaves, can grow to six feet tall; *B. kenworthyi* has unusual ivylike leaves with a gray-blue sheen; 'Brocade' is a star-leaved hybrid with tapestried silver leaves.

'Leslie Lynn', a sturdy new hybrid with satiny, star-shaped leaves.

Left. *Begonia hispida cuculifera.*

Rex begonias are mostly rhizomatous. There are, however, some upright and branching varieties; these are the foliage begonias, often called "painted leaf," "peacock," or "caladium-leaved." Stately old 'Bertha McGregor' has silver-splotched, olive-green, maple-shaped leaves. Plushy 'Fireflush' ('Bettina Rothschild'), with red-zoned green leaves shimmering under fine red hairs, is now available in a mutation named 'Curly Fireflush'. The leaf is prominently spiralled where it joins the stem. Some of the most brilliant and rugged new rex begonias are offsprings of *B. diadema* and other rexes. Their foliage has more substance and seems to be more easily kept in perfect condition. Holiday-hued 'Merry Christmas' ('Ruhrtahl') is widely known and grown.

Except for the summer-flowering tuberous begonias usually grown in hanging baskets and garden beds, and the florists' winter-flowering tuberous types, begonias of all groups have many cultural preferences in common. A few have individual idiosyncracies.

LIGHT AND SUNLIGHT. Begonias are not "shade plants" except in tropical areas. In poor, dim light they will grow lanky and leggy; without sunlight they will flower sparsely, if at all. In winter, early spring, and late fall they need all the sun they can get; in midsummer, they need shade only against the hottest sun around midday. "Wax" and "angel-wing" begonias need the most sun, the foliage rex begonias the least. The majority of begonias are good subjects for growing under proper set-up of artificial light.

TEMPERATURE. Begonias are usually best at about 65° to 70° in winter, give and take five degrees on either side. The "wax" varieties grow better on the cool side, the rexes and tropical species in more warmth.

HUMIDITY. Most house plants will do better when the relative humidity measures fifty per cent or higher, but many of the more popular begonias, particularly the hairy-leaved and rhizomatous types, will do with less.

WATERING. Proper watering depends on the type of plant, the weather, the pot, and the soil in the pot. Too little water is safer than too much. Dried-out, wilted begonias will revive quickly when the pot is soaked to the rim in water—if they haven't been dry for too long. But overwatering can result in incurable rot. Too much water causes "angel wing" begonias to drop their lower leaves, hairy leaves to wilt, and "wax" begonias to rot at the base. Feel the soil. If it feels dry, water; if not don't.

SOIL. Any light, porous, slightly acid potting mixture is satisfactory for most types. For rex begonias and tender tropicals, add extra organic matter such as leafmold or rotted or dehydrated manure.

FERTILIZING. Feed begonias only when they are growing actively, never when they are ailing or resting after they have bloomed. Use weak manure "tea," fish emulsion, or a complete house-plant fertilizer according to package directions.

DORMANCY. Many of the rex and some of the rhizomatous begonias are subject to varying degrees of winter dormancy. If a few or all of the leaves drop off suddenly, yet the rhizome feels firm and springy to the touch, hold back on water and hold off on food until fresh new growth signals awakening life, usually in early spring.

PRE-EMERGENCE CRABGRASS CONTROL

By RALPH E. ENGEL

Dr. Engel is Professor in Turfgrass Management at Rutgers — the State University, New Brunswick, New Jersey.

CRABGRASS IS THE MOST SERIOUS turf weed in the northern United States. It destroys considerable turf when growing vigorously. It also detracts from the appearance of the lawn and interferes with grass management. Many procedures have been used for the control of this weed; some have been quite successful. Pre-emergence is one of the best theoretical methods of control. This technique is based on destruction of the crabgrass through action of a chemical before or near the time of germination. The advantages of this method are elimination of the plant while it is young and before it becomes large enough to crowd or smother the turfgrasses.

Pre-emergence crabgrass control was contemplated twenty-five years ago. However, most of the formal research on this principle has been done in the last five years. The development of promising chemicals encouraged the recent upsurge of interest in pre-emergence crabgrass control.

How does the chemical prevent the crabgrass plant from developing? This has been one of the most fascinating questions. It appears that most chemicals destroy the crabgrass plant as the seedling germinates. Possibly some kill the dormant crabgrass seed. Germination appears to be arrested or delayed by several of the chemicals.

Safety of the pre-emergence herbicides is one of the major concerns. This is a factor that should be checked on each type of product. Most of the materials are not required to carry a poison label and can be applied safely with reasonable precautions. Concern is frequently expressed over the possible danger to pets and birds after the chemicals are spread over the lawn. Proper distribution gives sufficient dilution so that pets and birds are not endangered.

Most of the control materials affect the turfgrass. Usually these effects are not sufficiently serious to be of concern. Sometimes loss of the turf may result. The materials vary in the longevity of their activity. Those that fail to become inactive at the close of the season can be a problem, if reseeding of the turfgrass should be necessary. Most of the pre-emergence herbicides can have a severe action

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SOME THOUGHTS ON GROWING PLANTS INDOORS

By ERNESTA DRINKER BALLARD

Mrs. Ballard's interest in house plants began with six "wax" begonias and several pots of ivy. Now her house is filled with plants, and they overflow into the greenhouse. Her hobby has grown and developed into a successful business. Mrs. Ballard (a graduate of Pennsylvania School of Horticulture for Woman at Ambler, now an adjunct of Temple University, Philadelphia) is grower, exhibitor, lecturer, and author. In 1958, Harper & Brothers published her book *Garden in Your House;* in April 1962, they will publish her new book *The Art of Training Plants.* The following is based on Mrs. Ballard's talk on "House Plants" which was given during the 1962 Downtown Lecture Series, sponsored by the Volunteer Associates of The New York Botanical Garden.

ENVIRONMENT PLAYS A FAR more important role in the success or failure of an indoor garden than most gardeners realize. I have seen people who do well with a group of plants in one room of a house meet with failure in growing the same plants by the same method in another location. Such an experience can be explained only by a difference in environment—a change in the amount of light available, the humidity of the air, or the night temperature.

When you become aware of such things, you will be surprised how different the environment can be in different houses or in different locations in the same house. I live in a drafty old house where the winter temperatures are about 65° in the daytime and ten degrees lower at night. Fortunately, I have several deep south-facing window sills and a sun porch with glass on two sides which provide reasonably sunny places for growing plants. A humidifier, aided by the relatively low temperatures, keeps the humidity on the porch at thirty to fifty per cent most of the time. In contrast, I have friends who live in modern houses heated to 70° or even 75°, with huge expanses of glass providing twice as much illumination as in mine. Unless the builder has furnished a very large-capacity humidifier, the humidity in their houses ranges from ten per cent to fifteen per cent and sometimes falls as low as five per cent. No wonder their results are different from mine.

Choosing plants that will live in your particular combination of light, temperature, and humidity is the first step toward achieving a decorative indoor garden. Information about the plants' native habitats and their manner of growth helps in making the selection.

In the first place, remember that virtually all plants that are suitable for growing indoors are natives of the tropics or the warm subtropics. With very few exceptions, species from cooler climates are unable to adapt themselves to the hot, dry air of our houses.

However, this does not mean that every tropical plant

A typical tropical foliage plant, *Spathiphyllum clevelandii,* which will grow well indoors if the relative humidity is not too low.

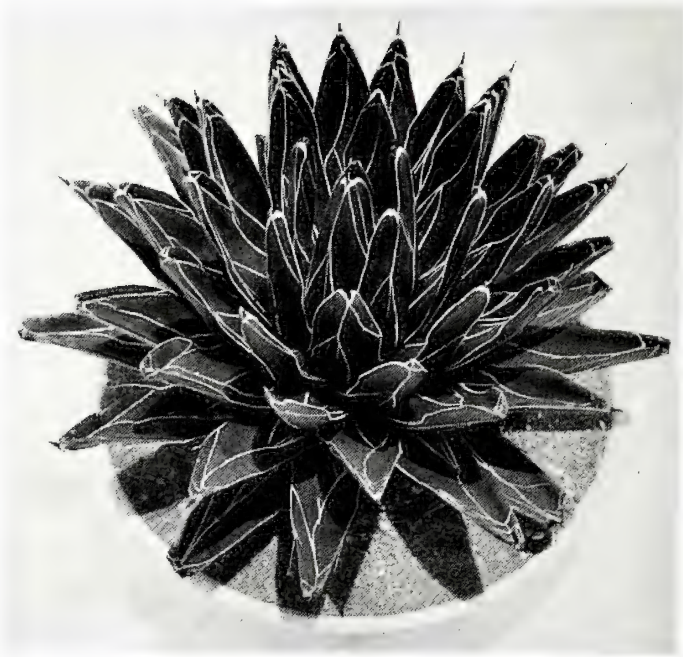
will make a house plant. Among the tropicals there is a wide range of adaptability. The species that are commonly sold for the house can withstand the conditions found in most indoor gardens. Of course, they do not grow as vigorously indoors as in their native habitats, but they maintain an attractive appearance. Once you venture beyond these established favorites, you are largely on your own. I have found that some plants generally recommended for greenhouses slowly die in the house, usually as a result of the prevailing high temperatures. Others will do quite well, at least in carefully chosen situations. When I was working on my book *Garden in Your House,* I tried more than eight hundred species and varieties indoors and achieved acceptable results with at least five hundred of them in one location or another.

Bearing in mind, then, that most house plants are tropicals, let us look at some of the growing conditions found in the tropics. First, there is the tropical rainforest, where the temperature varies little from season to season, from day to day, or from day to night. The thermometer hovers around 80°—not as hot as New York City in July, but not much warmer than many people keep their houses in the winter. Rain falls every day, raising the humidity above seventy per cent and making the forest damp and dripping most of the time. Because of the fantastic growth of the trees and vines, most of the forest is quite dark, shaded by the leafy canopy overhead; and the growing medium, either on the forest floor or in niches and crannies in the trees, is a thin layer of spongy, half-decayed organic matter more nearly resembling sphagnum moss than soil.

From such jungles come some of our most common indoor plants: philodendrons, pothos, prayer-plants, columneas, lipstick vine, bromeliads, and orchids without number. Many of them are especially adapted to jungle conditions. Some, like certain philodendrons, develop thick aerial roots to absorb moisture and nutrients from the humid air. Bromeliads cling to the trees with holdfast roots and absorb moisture through their leaves. They are epiphytes, not parasites, using their hosts as a perch but not as a source of sustenance.

The trick of growing jungle plants indoors is keeping the relative humidity as high as possible. Jungle plants are accustomed to subdued light and will tolerate even the comparative darkness of a north window in winter. Many will also withstand night temperatures as low as 60°, but they should have as much moisture in the air as possible, an atmosphere resembling that of their humid habitat.

The traditional ways of increasing humidity are setting the pots on damp pebbles and spraying periodically with a fine mist spray. These are effective and will produce satisfactory results if applied diligently. However, there is another aid that no serious indoor gardener should overlook — the humidifier. Manufacturers today offer heavy-duty cold-steam humidifiers controlled by humidistats which will raise the humidity in a large room (or several small ones) as much as twenty per cent. Also, more and more frequently effective humidifiers are being installed as part of the heating systems in new houses. In either case, you will find the effects almost unbelievable. The air seems fresher, the plants grow better, the piano stays in tune, and the inhabitants of the house are healthier. Moreover, since damp air seems



Agave victoriae-reginae, a native of the American desert.

warmer than dry air (provided there is no wind), the thermostat can be set two or three degrees lower in a humid house than in a dry one. All in all, a humidifier is one of the best investments an indoor gardener can make.

The second important kind of tropical climate is that marked by distinct dry seasons alternating with rainy seasons, such as occur in much of southeast Asia. Some of the best plants for indoor culture come from such a climate, and their distinguishing characteristics are tuberous roots, thick underground stems, or a deciduous habit of growth. During the dry season, the above-ground parts are shriveled or leafless. During the rainy season they flourish and grow. Gloxinias, amaryllis, caladiums, achimenes, tuberous begonias, and some of the orchids are examples.

Plants from a climate with alternating wet and dry seasons store excess carbohydrates and moisture while growing conditions are favorable. When the dry season comes, they lapse into dormancy, a state of suspended animation in which they can live for months on their reserves. So ingrained is this habit that it cannot be broken. No matter how regularly these plants are watered or how high the humidity, they become dormant from time to time and have to be rested until they are ready to resume growth. In this habit lies one of their strengths. If the indoor gardener forgets to water them, they do not die; they merely retire into premature dormancy.

Progressing northward from the region of the true tropics, we come to more temperate climates that have definite winters and summers. I shall call these regions the subtropics. Speaking very generally, they are areas where the temperatures never fall below 32° but may rise to the 90°s in summer; where winters are cool but not cold for any substantial length of time; where it rains occasionally, but is sunny and pleasant more often than not. Many of our winter vacation resorts, such as Florida and southern Italy, are subtropical.

In the subtropics, plant growth is not as lush as in the rainforests. The plants grow in summer and are dormant

(sometimes even losing their leaves) for a short time in winter. There is time for leaves and other organic matter to decay fully, forming humus in the soil.

Subtropical plants include azaleas, gardenias, camellias, orange and lemon trees, geraniums, petunias, marigolds, and a host of others. Most of those that are perennial will not do well if they are deprived of the short winter's rest to which they have become accustomed. For this reason they are not adapted to well-heated, modern houses that have no cool places. But if you have cold, drafty window sills or an unheated porch, you can grow subtropicals.

The fourth important habitat of house plants is the desert. Vast areas of the tropical and subtropical world have less than fifteen inches of rain annually. In these arid regions, the air is very dry (as it is in most centrally heated buildings), and the daily fluctuations in temperature may be quite extreme. The vegetation is characterized by specially adapted succulent leaves and swollen stems that store water and at the same time reduce the loss of water through transpiration. Desert plants can live many months on their stored reserves. Their one requirement is full sun for a substantial part of the year. Cacti, agaves, and echeverias from the American deserts, and euphorbias, aloës, and crassulas from South Africa fall into this category of plants.

Armed with this rudimentary information about plant environments, you should find it easier to choose suitable plants for various sites. Perhaps the space at the bottom of a south-facing picture window calls for desert plants; cool porches and window sills call for subtropicals; and warm, moist locations for jungle dwellers. Plants accustomed to dry seasons may do well in a wide range of locations, provided the gardener reconciles himself to their need for dormant periods.

Many woody plants from the subtropics, such as fortunella kumquat, *Fortunella hindsii*, make fine plants for locations that are cool in winter.

As a beginning, all that is necessary is to know the botanical name of the plant you are considering. Any good horticultural dictionary will tell you its place of origin, and any school geography text will tell you the climate of that place. Common sense will tell you whether a plant accustomed to such a climate will tolerate the condition you can provide.

In addition, to giving some thought to a plant's native habitat, consider whether it is woody or herbaceous. A plant with a woody stem has potentially a long life-span. Periodic pruning of its roots and branches and continual pinching of new growth will maintain it at any desired size. A Japanese bonsai tree may be seventy-five years old and only twenty-four inches tall, its growth controlled by the gardeners who tend it.

On the other hand, a herbaceous plant (one without a woody stem) is comparatively short-lived. The roots or underground stems of some are perennial and may live many years, but it is the nature of most herbaceous plants to renew their above-ground parts periodically, usually once a year. Winter cold, dry spells, and devouring animals, birds, or insects are nature's pruning tools in removing the old growth to make way for new. Indoors, the gardener must perform this function. And it is an essential one. No matter how much you cherish your house plants, you must steel yourself to prune most of them drastically (that is, cut away all or a large part of the foliage) at least once a year if they are herbaceous in nature. A very few, like the cast-iron-plant *(Aspidistra elatior)* or the familiar sanseveria, belie the rule.

The most commonly grown herbaceous house plants include begonias, African violets, gloxinias and other gesneriads, geraniums, philodendrons, bromeliads, and orchids. Without exception these will be handsomer if the old growth is cut away periodically to encourage the development of new buds and shoots near the base of the plant. The only alternative is to propagate new plants and discard the old ones. Young plants are invariably more vigorous, and if you keep replacements coming along every season, your indoor garden will be greatly benefited. I have very few herbaceous plants in my collection that are more than three years old. Most are less than two.

If there is any unifying theme to these thoughts on indoor gardening, it is this: study horticulture and related branches of knowledge—botany, ecology, plant geography, soil science—and apply them to your plants. Too many gardeners try to get along by memorizing practices and procedures without understanding the reasons why they are appropriate. If you make it a point to understand the scientific basis for growing different plants in different ways, you will find it much easier to avoid mistakes. The habit of inquiry will lead you down endless paths of knowledge and information and will bring you increased enjoyment from the plants you grow indoors.

CORAL MUSHROOMS

By CLARK T. ROGERSON

Dr. Rogerson is Curator of Cryptogamic Botany at The New York Botanical Garden.

AMONG THE MOST beautiful plants to be found in our forests and woodlands are the coral mushrooms or coral fungi. Bright colors predominate, ranging through many shades of white, yellow, orange, red, pink, rose, lavender, buff, tan, purple, brown, and gray. The appearance of several species is most attractive — delicate and graceful. In size, coral mushrooms vary from less than an inch to as much as a foot in height and width; in form, they may be simple, unbranched clubs or rods, may be branched in a tree-like manner from a main stalk, or more often are an intricate coral-like mass of branches arising from a fleshy core. These mushrooms sometimes weigh several pounds. The texture is typically soft, fleshy, brittle, and waxy, but ranges to tough and pliable, occasionally leathery.

Early naturalists noticed the resemblance in coloration, branching, and brittleness of these fungi to the corals in the oceans; hence the common name, coral mushrooms. The resemblance is superficial only: coral mushrooms are fungi and have plant-like characteristics; the corals of the oceans are the skeletons of certain marine animals (polyps). Scientifically the coral mushrooms have been given the name *Clavaria,* from a word meaning club. Some of the species produce fruiting structures which are simple, unbranched, and club-like. Over one hundred species of *Clavaria* are known from North America.

Clavaria vermicularis, wormlike coral mushroom. Plants gregarious in clusters of two, three, to a dozen, usually simple, rod-shaped, unbranched, tapering upward, three to six inches in height, one-quarter to one-third of an inch in width; pure watery white when young and fresh, but becoming tinted with light citron-yellow at the tip and often pale creamy flesh color below. On the ground in woods. Edible with excellent qualities.

Clavaria fusiformis, spindle-shaped coral mushroom. Plants club-like, usually appearing in groups, sometimes in dense clusters, cylindrical and hollow, sometimes flattened, three to eight inches in height, one-quarter of an inch to one inch in width, deep primrose-yellow or brownish yellow. Common and widely distributed, occurring on humus or mossy soil in woods. Edible, tender, and well-flavored.

Clavaria kunzei, Kunze's coral mushroom. Plants branching from the ground into clustered and often fused stalks, individual tufts delicate, slender throughout, one to five inches in height and width, much branched, pure ivory or milk-white, becoming tan or buff-brown with reddish upper parts in age. Gregarious on soil, rotting bark, or mosses in moist deciduous woods, sometimes in grassy open areas. Edibility not recorded.

In the clavarias, reproduction is by means of spores produced on microscopic club-shaped cells which cover most of the above-ground portions of the plants — the fruit bodies. The spores are shot away from the fruit-body surfaces and are air-borne. If a mature specimen is placed on white paper and covered, spores will be discharged and fall upon the paper, forming a powdery spore print which may be white, yellow, or brown in color. Spores are microscopic, one-celled, from round to elliptical in shape, with smooth, rough, or spiny walls.

When the spores land in a suitable habitat under favorable conditions of temperature and moisture, germination occurs, and branching thread-like filaments are produced which develop within the substrate. Clavarias, for the most part, are saprophytic and live on dead organic matter. Some species grow on decaying logs; most live on fallen leaves or on the ground, obtaining their food from leafmold and humus. One fairly common tiny species, *Clavaria mucida,* grows only on decorticated, rotting logs that are covered with green algae; it is possibly parasitic on an alga.

From the branching mass of filaments growing through-

Clavaria formosa, finely-formed coral mushroom. Plants branched, the main branches remaining partially free from each other to the ground, branchlets upright ending in minute cusps, axils rounded, three to six inches in height, two to four inches in width, base white, when young, the main body usually creamy flesh color, often pink or salmon-buff, the tips distinctly yellowish; towards maturity, the color fades to a creamy tan, then to light leather, finally ochraceous tan. On the ground in woods, frequently in rows several feet long. Edibility: recent American reports indicate that it is poisonous or that the flavor is not agreeable. It is said to be edible and esteemed in Europe.

Clavaria longicaulis, long-stemmed coral mushroom. Plants small to moderate in size, narrow, distinctly stalked, irregularly branched above into a tuft of upright, terete, wrinkled branches, ultimate subdivisions ending in small cusps, one to four inches in height, one-half to one and one-half inches in width, white below, cinnamon tawny above, tips lighter. Gregarious or loosely clustered in leafmold or mosses in frondose woods. Edibility not recorded; taste is bitter.

Clavaria aurea, golden coral mushroom. Plants large, repeatedly and densely branched, often three to six inches in height and width, frequently weighing one or more pounds, a uniform beautiful orange except at the base which is whitish, in age becoming dingy yellow. In woods and forests. Edible and good.

Clavaria flavobrunnescens, yellow-brown coral mushroom. Plants branching at the ground into several main branches which soon branch several times to form an open mass, ultimate tips delicate to blunt, more or less cusped, bushy, four to eight inches in height and width, varying from clear pale cream to light cream-yellow, to a deep rich, clear primuline or chrome-yellow, becoming ochraceous to brownish yellow. On the ground in woods and open places. Edible; taste and odor pleasant.

out the wood or humus, fruiting bodies eventually will appear. In the eastern United States fruiting is most pronounced during July and August, if rainfall is normal; some species fruit until fall.

Most of the coral mushrooms are tender and may be used for food if large enough, but they vary decidedly in palatability. In some of the popular mushroom books, all coral mushrooms are listed as being safe for food — no poisonous species being known. However, in recent times, several species have been reported as unwholesome and even dangerous. *Clavaria gelatinosa* and *Clavaria formosa* have been recorded as poisonous. For some persons several of the clavarias act as a cathartic. As with other sorts of mushrooms, each specimen must be identified correctly before being prepared for the table. If the individual has not eaten a species previously, he should test by cautiously eating small portions of it. Most of the species are edible and can be used in soups, stews, and patties. They remind one of noodles or macaroni. Fried in butter they are crisp, choice bits.

Sparassis crispa, cauliflower mushroom. Plants up to twelve inches in diameter, occasionally two feet, fleshy, erect, much branched, with brittle, flattened, ribbon-like lobes, often wavy or curled, white to grayish or pale yellow, edges brown in age. On stumps or on the ground in woods, summer and autumn. Edible: flavor excellent, makes an ever-to-be-remembered dish.

The photographs illustrate several clavarias and a few fungi resembling coral mushrooms in form or color.

Lachnocladium ornatipes, downy branched fungus. Plant tree-like, with long distinct terete hairy stem branched at apex into several leaders which rebranch, tips blunt, one to four inches in height, narrow, pale buffy straw color to vivaceous brown, except for whitish tips, tough and pliable. On the ground in frondose forests and under conifers. Unwholesome.

Tremellodendron candidum, white, tree-like, trembling fungus. Plants erect, leathery or tough, gregarious, or clustered; branches with fused stems, white, brownish in age. Common in open hardwood stands in summer and fall. Looks like the coral mushrooms but is quite different and is related to the jelly fungi. Unpalatable.

NEW ZEALAND REVISITED

By PIERRE DANSEREAU

Dr. Dansereau is Assistant Director (Botany) and Senior Curator of The New York Botanical Garden.

Continued from the January-February, 1962 issue

III. DUNEDIN. I.

610416.—DUNEDIN

Sunday. Empty streets in full sunlight. Each bungalow with its twin bow-windows, its small garden overflowing with roses and chrysanthemums (they do *not* call them "mums" here, thank goodness!). Stiff, dark evergreen hedges of holly and *Senecio.* Most of the small shops have the style of the rural "general store." Mass in a mission-like church, reassuringly poor. Not Irish but Scottish. Sunday is Sunday, and all small boys have been bathed and brushed, and little girls are proud of new shoes and hat. An anemic young priest has touchingly little to say. But the local Catholic paper, the *New Zealand Tablet,* is vigorously liberal, faces up to the ambiguities of Graham Greene's *A Burnt-out Case.*

Geoff Baylis drives us to the high points that dominate the city. The air is brisk and drenched with a clear light. The rows of little houses (mostly white and pink) seem to flow down to the great harbour amid rows of trees and strips of gardens. Considerable plantings of beech *(Fagus sylvatica)* provide a nostalgic British autumn melancholy, which is out of step with the native evergreenness.

Tea at Geoff's in his tall gabled Victorian mansion, red and green and staring out of all its windows from the top of its hill onto the vast sweep of the harbour and the hills. High Street reminds one of San Francisco. The gardens vertiginously scale the terraces and spread the profusion of their shrubbery over the whole surface. Flowers everywhere. In every house (even a bachelor's) the most exquisite and imaginative flower arrangements.

610417.

The Botany Department of the University of Otago, where I shall spend the next two months or more, is quite remarkable. It is a sort of annex to the basement floor of the Otago Museum, has a couple of greenhouses in a small experimental garden. Row upon row of gray-green tussocks and bush upon bush of beautiful native evergreen shrubs: *Senecio, Pseudopanax, Phyllocladus, Hebe.* The department itself, intricate: all doors and corridor. Two labs for twenty-five to thirty students, several tiny offices. No central heating, of course. Wiring haywire. But, order withall. A good herbarium, a fairly good library. And much excellent work in progress. At tea-time (tea is "old hat" nowadays, much to my chagrin, and we have coffee) we all sit on stools, and there is much good-humoured banter along with huddling and rubbing of one's cold hands. Dr. Martin Holdsworth is an old acquaintance (from Ghana, 1957). Dr. Alan Mark recently returned from doctoral work in North Carolina with Oosting and Billings. Dr. George Scott, a very Scottish young Scot, complete with kilts as everyday apparel, is a recent graduate of Bangor (under P. W. Richards).

610422.

First honest-to-goodness excursion. To Mt. Cargill (2,216 feet) with Geoff Baylis. We leave the car on the shoulder of the mountain, climb fences, and walk through fields increasingly soft and wet underfoot. A sharp autumn sun outlines every crease and fold in the hills below us, mostly stripped to grass and sometimes to their rocky ribs, green and a very rich brown. The manuka scrub *(Leptospermum scoparium)* grayish and mottled with the brighter green and gold of gorse *(Ulex europaeus).* Cabbage trees *(Cordyline australis)* pierce the scrub with their strong and slender trunks and line the crests with lush perched rosettes of sword-like leaves.

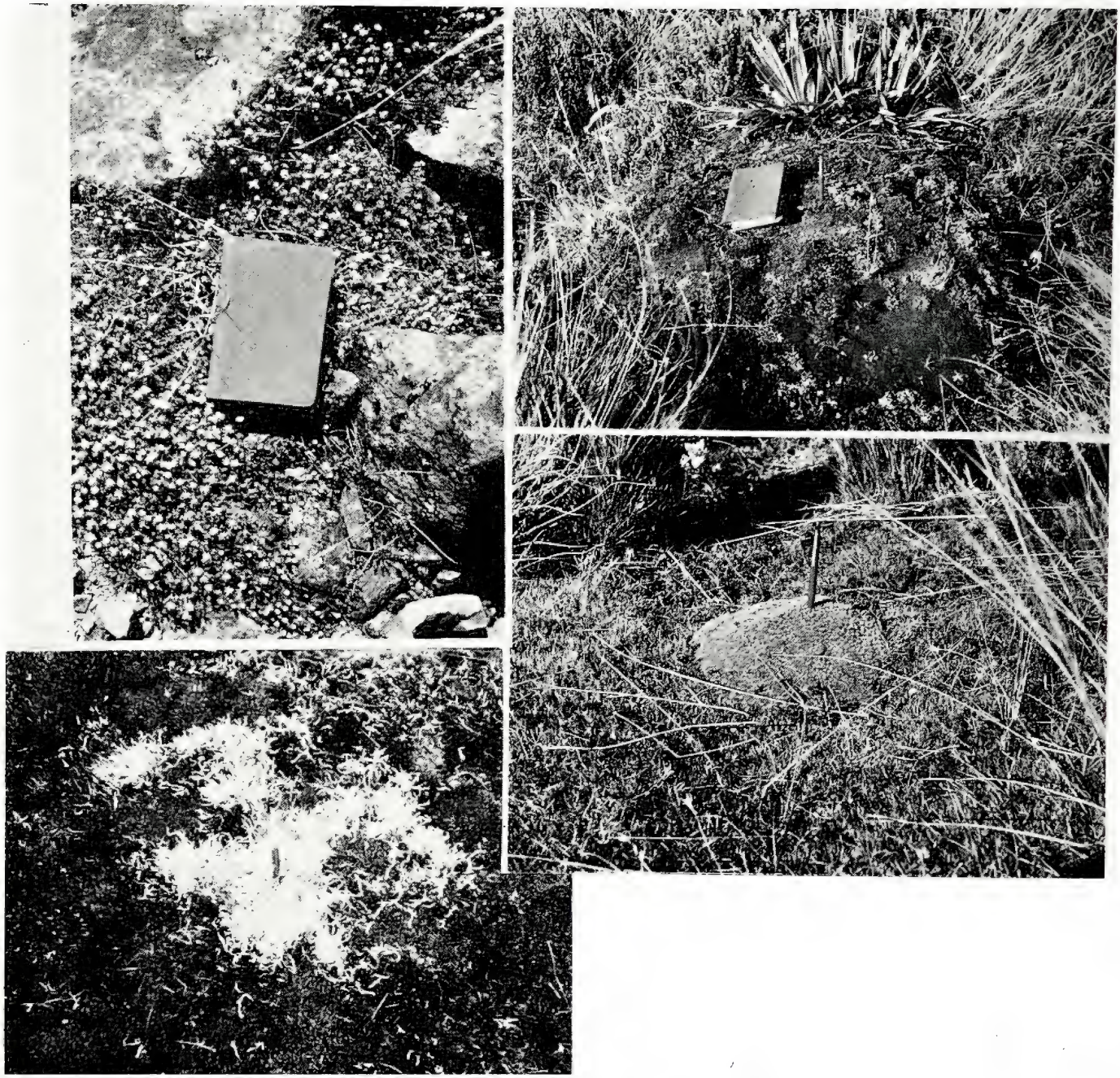
But presently we enter an old pasture overgrown (as it would be by hawthorns at home) by a switch-shrub, *Coprosma propinqua,* with spine-like branches and an infinity of tiny brownish green leaves. The swampy pond is hirsute with rushes. Presently, however, it is the paradoxical *Dracophyllum longifolium* that takes over. This epacridaceous plant (related to the *Ericaceae*) has long and narrow leaves, very much like those of a bamboo (e.g., the South American alpine *Chusquea*). It can become very tall. And indeed we find one that is tree-size, a relict of pioneer conditions in the very midst of a dense forest dominated by *Libocedrus bidwillii, Dacrydium biforme* and *Podocarpus hallii.* This forest is extremely rich in ferns and bryophytes. On steep topography the trees (except *Libocedrus*) extend at precarious angles. The aspect of the whole stand is very reminiscent of the Madeiran laurel forest. Many evergreen shrubs *(Phyllocladus alpinus, Coprosma* spp., *Pseudowintera* (erstwhile *Drimys*) *colorata*).

Mostly, however, scrub predominates, with *Cassinia fulvida, Coprosma pseudocuneata, Dracophyllum longifolium.* Near the very top, big clumps of the mountain flax, *Phormium colensoi,* and carpets of the creeping Composite, *Raoulia glabra,* and *Gaultheria antipoda.*

610423.

A day in the mountains again, this time with Geoff Baylis, Alan Mark, and Eric Godley, the head of the Botany Division of D.S.I.R. (Department of Scientific and Industrial Research, the near equivalent of the National Research Council in Canada). A brisk day, typically autumnal as we wind southward up and down hill to our destination. Maungatua appears in the distance: a vast dome on the horizon, the shape of a walnut with its perfect hemispherical line and the creases that fold all over its surface. From the valley below where the fields are flat, wedges of dark green forest extend halfway upward. But as we approach the mountain and begin to ascend, the surface consists of uninterrupted grassland, smooth and slightly fretted by the wind, a blond fleece snugly clinging to its rugged pelt.

The land rover goes its chaotic way through rut and over stone and boulder. A variety of gates hinged with much



Upper left. *Raoulia glabra* growing among crumbling rocks, near the top of Mt. Cargill.
Upper right. A cushion of *Donatia novae-zealandiae* surrounded by tufts of *Danthonia rigida* and rosettes of *Celmisia coriacea var. stricta*. Maungatua.
Lower right. A cushion of *Celmisia argentea* surrounded by a mat of *Oreobolus pectinatus*. Maungatua.
Lower left. The arctic-alpine lichen *Thamnolia vermicularis* growing on a dense carpet of *Oreobolus pectinatus*. Maungatua.

imagination by knots of barbed wire which have to be unraveled, opened, and tied back (Saskatchewan style, no less!). Snow tussock *(Danthonia rigida)* dominates, a very large cespitose grass, green on its midrib, withering at the brownish tip, but exuberant in its spread. As we rise in altitude many variants appear, due not only to overgrazing — where browntop *(Agrostis tenuis)* takes over — but also to altitude. For instance, below two thousand feet the snow-grass is interspersed with the acerated green-and-rust rosettes of *Aciphylla colensoi* (an Umbellifer very reminiscent of the South American grassland *Eryngium* species). Above this level appear the soft rosettes of *Celmisia coriacea* var. *stricta*.

The end of the trail is just below the summit (2,936 feet), and we stop at the edge of a pond surrounded by bog! And what a bog! It is the cushion-type, an Oceanic New Zealand-Chilean type. Large emerald-green medallions of *Donatia novae-zealandiae*, irregularly studded with flowers and fruits, are embedded in a tight golden matrix of *Oreobolus* and *Gaimardia* and garlanded with bristling reddish *Dracophyllum prostratum* and *Pentachondra pumila*. The *Donatia (Donatiaceae* or *Stylidiaceae?)* is so tight that a man's weight hardly leaves the imprint of a heel upon it. *Phyllachne rubra* (decidedly of the *Stylidiaceae*) is hard to tell from the mosses at first glance. And there are many others. Godley, who was on a Royal Society of New Zealand Expedition to Chile recently, enumerates vicariant species for almost all members of this typically subantarctic bog.

Left. Dr. Alan Mark in a subalpine scrub of *Dracophyllum longifolium* one hundred and twenty years old. Maungatua.
Below. Eroded surface near the top of Maungatua, revealing buried trunks of *Dacrydium biforme* and *D. bidwillii*, radiocarbon-dated about 1400 A.D. Snow-tussock *(Danthonia rigida)* in the background.

But this massif has many more things to offer. Alan Mark has made an exhaustive study of it* and is still taking micrometeorological records. These studies are a contribution to the disputed question of climax grassland in a forest climate. A burnt and eroded surface uncovers trunks of *Dacrydium biforme* (radiocarbon-dated 1400 A.D., date of arrival of the fire-setting Maoris!). Moreover, the mountainside is riddled with large pores which are thought to be the traces of uprooted trees. They are called "forest dimples" and often conserve a sylvatic A-horizon.**

As we dig one of them up, the sun has gone behind the clouds, and the air is bitter and all turns gray, with a heaviness in the air and a chilling wind. Almost as far as we can see: wiry grass like unkempt hair blowing, rustling.

610430.—SHAG VALLEY

Vice-Chancellor and Mrs. Soper come to pick us up at our V.I.P. Flat (as it is generally known). As we ramble along on Route No. 1 towards Palmerston, the countryside is mostly green pastureland and light-coloured tussocks. Sheep. Sheep. Sheep. A great many green valleys, with large silver-gray clusters of manuka on the eroded slopes. An isolated cabbage tree here and there. Many Monterey pines and cypresses planted. We stop for a moment on the bank of a river. Are we in Europe? The autumn sun very pleasant through the golden foliage of the Italian poplars. We move about, parting the still green curtain of weeping willows. But here is indeed a native: the fantail, that very lively, capricious little bird. Repeatedly he flies at our heads, swerving on black wings, turning abruptly to show a white belly, alighting on the slender willow branches. Black and white, with a huge tail which he spreads like a fan.

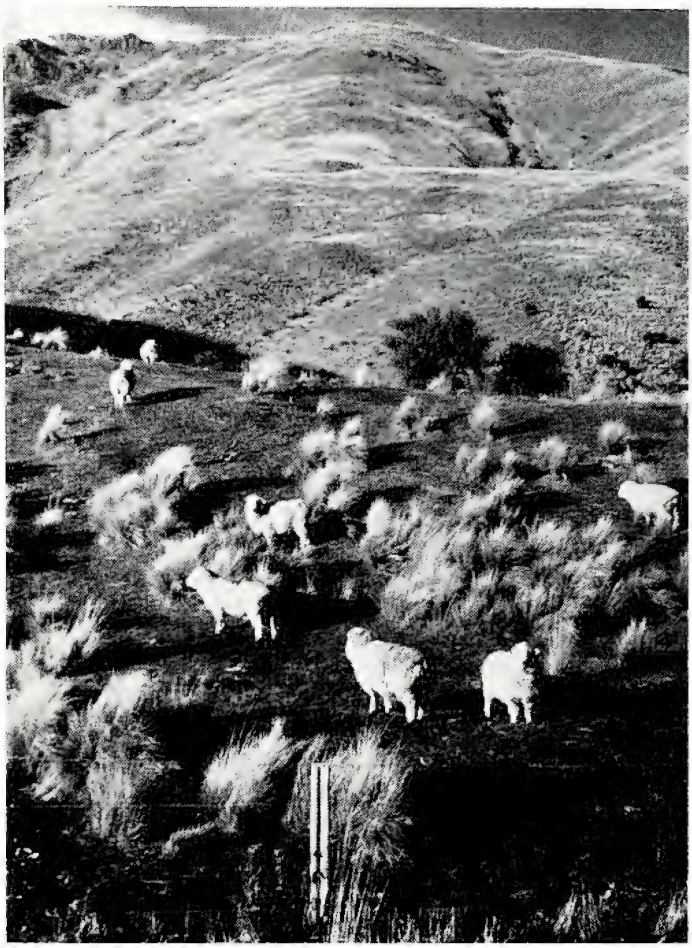
At the home of Miss Brenda Bell, we are indeed in the country of W. H. Hudson. "Far away and long ago?" But, of course, it is a way of life that is no more. The rich owner of a "station" (ranch in America) with its beautiful old home, its century-old trees, its gardens, its out-buildings, its paddocks, its fences, its tractors, its shelters, its shepherds. Yes, all that, but in the New Zealand style, that is to say, as far from Texan capitalism as from Spanish feudalism.

The Soper's car stops before the rather narrow porch: the veranda furnished with wicker chairs and old, sun-faded hassocks. A small, energetic woman arises, smiling, from the deep shade. This is Dr. Elizabeth Gregory, Dean

*Alan F. Mark, 1955. Shrubland and grassland of Maungatua, Otago. N.Z. Journ. Sci. & Techn., A.37(4):349-366.
**See also P. Wardle and A. F. Mark, 1956. Vegetation and climate in the Dunedin District. Trans. Roy. Soc. N.Z., 84(1):33-44.

Shag Valley with turnip field, leafless willows *(Salix fragilis)*, Monterey pine *(Pinus radiata)*, and pasture.

Shag Valley landscape, typical of Otago sheep country. In the foreground, overgrazed pasture with browntop *(Agrostis tenuis)*. In the middle ground, ploughed fields. In the hollow, *Salix fragilis*. On the hillside, screen of Monterey pine *(Pinus radiata)*. Above, pasture.



Corriedale sheep with fescue *(Festuca novae-zealandiae)* and matagouri *(Discaria toumatou)* in Shag Valley.

of Home Science. Our hostess, Miss Brenda Bell, may be seventy, but she is sprightly, full of vitality. She has seen the whole world, knows Europe especially well. And the good things of life. Starting with cuisine: not a servant in the house, but an excellent meal with good wines and liqueurs. The finest lamb in the world. (What are you up to, Chamber of Commerce of Otago? Why do you not shower pamphlets upon Paris and New York? They have a right to know, and maybe this is your ticket of entry into the Common Market?) From my place at the table, in this happy mood, I can see on successive planes: the dazzling tablecloth, the silver, the fruit; the countenances of the guests (with complexions like fruit); the sun gentle within the recesses of the windows; the freshly cut grass; the scarlet clusters of the geraniums; the black curtain of the pines. And the special odour of country houses: the seasoned timber and a memory of grapes and apples and the musk of venison. All this woven together by the gold threads of the streaming sunlight and the congenial talk.

While the Vice-Chancellor has his siesta, the ladies and I stroll in the garden—the gardens. First view: a "Petit Trianon" on a somber lake (inhabited by ducks and swans) encircled by immense trees: sequoias, cypresses, cedars of Lebanon, chestnuts mixed with cabbage trees. Other scenes: alpine garden, rosery, orchard, kitchen garden, the whole in a most satisfying orderly disorder. Miss Bell makes us climb into her car and drives us across one length of her property. The shepherd's house: an old construction mod-

Musterers with dogs and horses in Shag Valley.

ernized, full of children and flowers. The sheepfold of great dimensions and equipped for shearing on a large scale. Waste fleece everywhere. And the sheep themselves everywhere on the green pasturelands. The true purpose of the promenade: an old walnut tree whose low-hanging branches are supported by props. In the cooling shade of afternoon we gather nuts from the ground, Miss Bell twice as quickly as we can, turning up her skirt to hold an ample supply. Châtelaine or peasant, a grande dame in both roles.

After a good tea beside the blazing hearth, flanked by two multicoloured, suspicious cats, we leave for Dunedin.

610501.—DUNEDIN

This evening, reunion at the Dunedin French Club, to which we have been invited. In the Staff Common Room, just below our apartment. Miss Sheddon presides, gives a biographical sketch of St.-Exupery. Then a young Frenchman, temporarily at the University of Otago, Daniel Lelong, presents on tape one of Grimm's fairy tales. After that the "Petit Prince" speaks through the voice of Gérard Philipe. This lasts a very long time. Everyone listens seriously, mimeographed copy in hand. Then comes deliverance: supper with biscuits and tea. Conversation (in French) with farmers, merchants, stenographers. Very congenial. A young agriculturist (D. Reid) puts several questions to me.

(To be continued)

Now Winter's winds are banished from the sky,
Gay laughs the blushing face of flowery Spring.
Now lays the land her duskier raiment by
And dons her grass-green vest, for signal why
Young plants may choose themselves appareling.

Now tendrils curl and earth bursts forth anew—
Now shepherd's pipe and fleecy clocks are gay—
Now sailors sail and Bacchus gets his due—
Now wild birds chirp and bees their toil pursue—
Sing, poet, thou—and sing thy best for May!

WILLIAM H. HARDINGE

A CENTURY OF PROGRESS
THE CONTRIBUTION OF BOTANIC GARDENS, SINGAPORE, TO THE DEVELOPMENT OF MALAYA

By H. M. BURKILL

Mr. Burkill, who is Director of Botanic Gardens, Singapore, prepared the following for presentation at the Symposium on "Tropical Botanic Gardens" in the Tenth Pacific Science Congress, held at the University of Hawaii, Honolulu, Hawaii, August 21 - September 6, 1961, and sponsored by the National Academy of Sciences, Bernice Pauhi Bishop Museum, and the University of Hawaii. The paper was read by W. W. C. Moir, President of the Hawaiian Botanical Gardens Foundation, Inc. Other papers presented at the symposium will be published in subsequent issues of *The Garden Journal*.

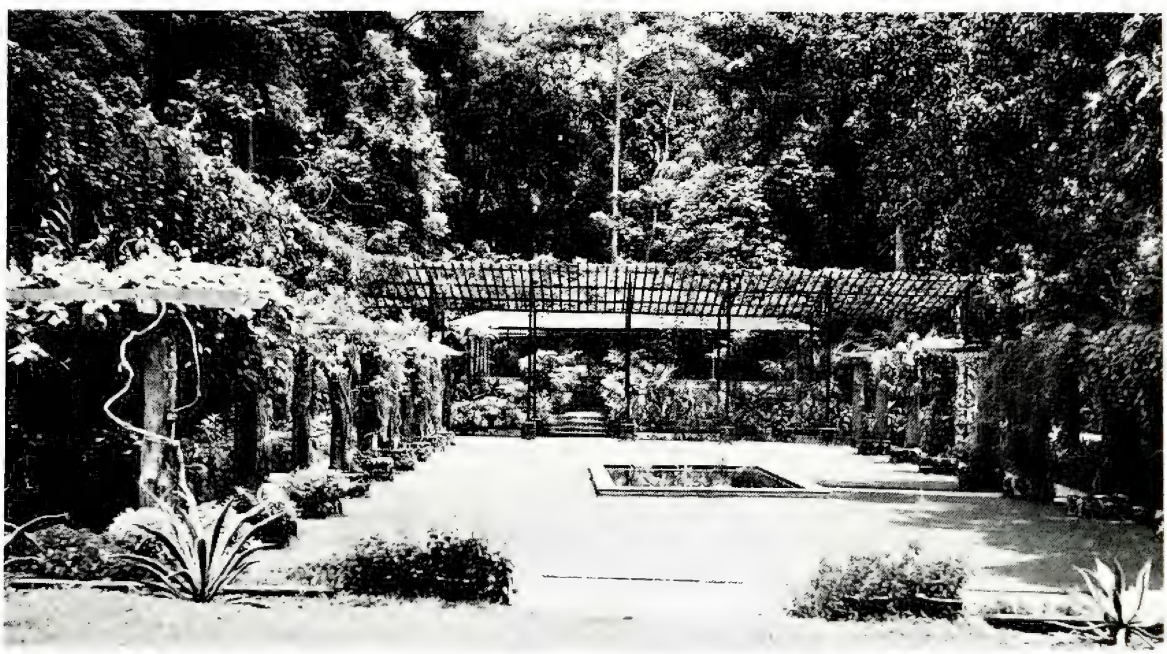
WHEN SIR STAMFORD RAFFLES established the Colony of Singapore as a trading post for the English East India Company in 1819, one of the first scientific organizations he created was a botanic garden. That was in 1822. Though that garden was not the origin of the present Gardens, Raffles' action showed the great importance there was attached to botanical matters — that the establishment of a garden for the scientific study of plants should rank in parity with such other vitally important matters to a new trading post as hydrographic surveys and civil engineering.

The present Botanic Gardens are the third to have been established in Singapore. Raffles' garden was abandoned in 1829, after his retirement on instructions from the Bengal headquarters of the East India Company under a mistaken notion of economy. The need for a garden remained, however, and an agri-horticultural society re-established one on the same site in 1836 and ran it for ten years. A new agri-horticultural society established the present gardens in 1859 on a site well removed from the town. In December, 1959, the Botanic Gardens celebrated their centenary.

The function of all these Gardens was to serve the growing agricultural needs of the new settlement. Many potential economic crop plants were propagated, but the most important were nutmegs, cloves, and cacao. The third and present garden was created with the object of being a garden for pleasure as well as for commercial ends.

Laurence Niven, the manager of a nearby nutmeg plantation, was the first superintendent, and as early as 1861 he had organized a flower show to encourage the local cultivation of vegetables, fruits, and flowers. In 1869 the society obtained increased government assistance. A zoo was also started and continued until 1905. By 1874, however, the Society could no longer carry on, and in 1875, the Government took over the running of the Gardens.

With this change in management came a change in function. The Government sought for the post of superintendent a trained systematic botanist with a practical aptitude who would travel the Malay Peninsula to investigate its vegetation. The Director of the Royal Botanic Gardens, Kew, England, sent out James Murton, a Kew-trained horticulturist. Four years later the Government allocated one hundred and two acres of land, now a part of the campus of the University of Malaya, on which Murton planted economic crops such as cinchona, coffee, eucalyptus, ipecacuanha, tea, maize, sugar-cane, cola nuts, mahogany, and many varieties of rubber-bearing plants. The most significant introduction of this period was that of *Hevea brasiliensis*. In 1877 the Royal Botanic Gardens, Kew, sent to the Botanic Gardens, Singapore, twenty-two seedlings, eleven of which were planted in the Economic Garden.



Lily pond in lawn of *Zoysia*, with plant house in rear and frame carrying creepers.

The offices and herbarium of the Botanic Gardens, Singapore.

Murton took another nine to Kuala Kangsar in Perak. The planting sites of the other two are open to conjecture and, anyhow, are now irrelevant. The progeny of the two main lots of trees has served, in a very large measure, to stock the plantations of Malaya and southeast Asia.

Murton was succeeded in 1880 by Nathaniel Cantley, another Kew-trained horticulturist. Cantley started the Singapore herbarium, which has grown to be the fourth largest in Asia with about four hundred thousand specimens. He established large numbers of Malayan and introduced timber trees in the Economic Garden. In 1882 the Government commissioned him to report on the forests of the Straits Settlement as a move to stop wasteful depredation of forest resources. On the basis of his report, the Government created a Forest Department with Cantley as its head; he held this post in addition to his duties as Superintendent of Gardens.

Cantley died in 1888, and Henry Nicholas Ridley became Director in the same year. The change in title from superintendent to director was significant. Ridley was a botanist first and foremost rather than a horticulturist, though withal he was a man of the most remarkably versa-

Cacti and succulents in one of the houses of the Botanic Gardens, Singapore.

Succulent bed on a stretch of lawn in the Botanic Gardens, Singapore.

tile interests and capacity for work. During his term of office, 1888-1912, the economic development of Malaya made the most extensive progress. Ridley was in point of fact the servant of the Government of the Straits Settlements, but his work and the activities of the Botanic Gardens were for the whole of the Malay Peninsula. Ridley and his assistants at Penang and Malacca continued to administer the Forest Department till 1895, by which time 88,336 acres of forest reserves had been secured in the Straits Settlements. In this year the forests were removed from the charge of the Botanic Gardens, on the recommendation of a retrenchment committee, to the care of the collector of land revenue.

Ridley, however, was not through with forests. In 1895 he advised on the formation of a forest service in Selangor, and in 1900 he assisted Hill of the Indian Forest Service, who was engaged to make recommendations on forest management in the Federated Malay States. In the following year the F.M.S. Forest Department was created, later to become a joint Straits Settlements–Federated Malay States Service with arrangements for loaning officers to the Unfederated Malay States. Thus was born the first of the worthy scions of the Botanic Gardens. Forestry work became the responsibility of a separate and technological department, but the Botanic Gardens have maintained the closest liaison with the foresters, more so than with any other department to the mutual advantage of both. This is equally true of the Gardens' relations with departments in the North Borneo territories of the British Commonwealth.

Ridley initiated and edited a periodical emanating from the Botanic Gardens under the title of *The Agricultural Bulletin of the Malay Peninsula,* which ran from 1891 to 1900. Its title was changed in 1901 to *The Agricultural Bulletin of the Straits and Federated Malay States,* and this publication appeared until 1912. Its title suggested an agricultural flavor, but its contents were most catholic and covered a wide range of subjects. It indicated, though, that

An avenue of *Cyrtostachys lakka* on the Lower Ring Road.

A specimen of *Ficus elastica*.

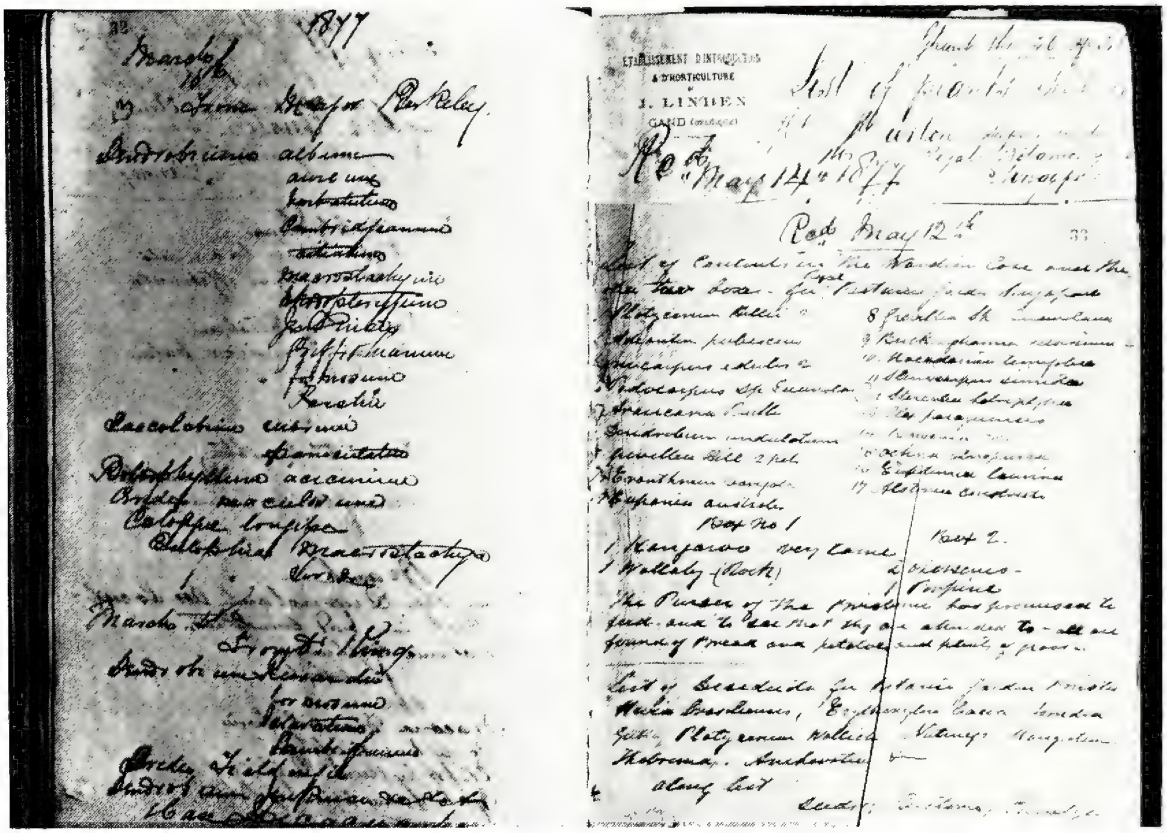
the need for dissemination of information lay primarly in the agri-horticultural field. These periodicals were, in fact, the only source of advice available to the planting community; but the growing need for assistance to planters and the like became too great for the Botanic Gardens to serve entirely satisfactorily, and so, in 1904, a separate Agricultural Department was established in the Federated Malay States. This, like the Forest Department, had arrangements for loaning officers to the Unfederated Malay States and later became a joint Straits Settlement–Federated Malay States Service. Thus was born the second of the worthy scions of the Botanic Gardens.

As in the field of forestry, this did not bring to a close the agricultural work of the Gardens. As already indicated, *The Agricultural Bulletin* was published by the Gardens till 1912, by which time the new Agricultural Department had found itself and had its own serial publication, *The Malayan Agricultural Journal.* The Gardens continued to introduce, cultivate, and select plants of economic importance in the Economic Garden of one hundred and two acres. Material was made available to the public and to commerce from this source till 1924, when the Economic Garden was lost to the Botanic Gardens for the creation of a college for higher education, now the University of Malaya.

Ridley's recommendations to the commercial community on economic crops had an uncanny ring of prescience. The story of the introduction of hevea rubber to southeast Asia is too well known to need repeating. Ridley's urgings to the planters to plant hevea rightly earned for him the title "the father of the rubber industry." He also drew attention to the possibilities for planting cacao and recommended the African oil palm as an estate crop. It is interesting, in retrospect, to note that the cultivation of cacao was not pursued until about 1948 when considerable attention and sums of money were spent on it in Malaya. Oil palm remained a novelty for several decades till the 1930's, but its acreage since 1945 has expanded considerably. Ridley's output of published papers amounted to over ten thousand pages; his *Flora of the Malay Peninsula,* running to over three thousand pages in five volumes, is still the main catalogue of the plant resources of the whole of Malaya; his books on *Spices* and *The Dispersal of Plants throughout the World* are classics and are still standard works of reference.

One aspect of the introduction of hevea, on which it is of interest to speculate, is the exact role envisaged for it. Certainly the establishment of plantations of rubber-bearing plants in India and the East had been proposed by Sir Clements Robert Markham of the India office before hevea had been obtained from Brazil; but all the early reports in Singapore suggest that hevea, when it was obtained, was looked on as a forest tree for forest estate improvement. Work on it was recorded in Forest Department reports. It was planted in forest reserves: in the Bukit Bruang Reserve in Malacca in 1890, and in the Sembawang and Bukit Mandai Reserves in Singapore in 1891 and 1892, respectively. Concurrently, Ridley was distributing seed to planters, but substantiation that the "forest tree" view held is emphasized by Hill's recommendation in 1900 on forest management against the introduction of exotics and spe-

Hevea brasiliensis. A budgraft (1924) of one of the highest-yielding trees of the original introduction; all the original trees are dead.



Two pages from the Plant Introduction Register, dated 1877. Animal receipts also recorded!

cifically that the Government should desist from further planting of hevea. However, with the removal of the forests from Ridley's keeping in 1895, Ridley perforce had to turn more to planters, and to a reluctant and sometimes opposed authority, whom he encouraged to plant hevea around their bungalows and district offices. This was, perhaps, fortune in disguise, for it is hardly likely that hevea could ever have been profitable as a forest crop.

When Ridley retired in 1912, I. H. Burkill was appointed Director of the Botanic Gardens. He had been Reporter on Economic Products to the Government of India and brought further emphasis to the Gardens' work on plants of commercial worth. He amassed a wealth of data on local uses of native plants, which has found permanent record in the two-volume *Dictionary of the Economic Products of the Malay Peninsula.* Though the Departments of Agriculture and Forestry in the Federated and Unfederated Malay States were then well established, the Botanic Gardens remained essentially, as it does to this day, of primary importance to the work of the Departments. The Economic Garden contained a large number of exploitable plants and was still a source of supply for the country—for example of *Hevea,* of which seven million seeds were distributed up to 1917. A list of planting material available in 1916 contains two hundred species.

With the final release of the Economic Garden in 1924, the Gardens' work turned more to fundamental taxonomic studies of the Malayan flora and to horticultural research. From 1875 onwards taxonomy had indeed been the main occupation of the Gardens, but the requirements of forestry and agriculture had loomed large. A separation between pure research and technology is a nebulous division, and the Botanic Gardens, perforce of circumstance, served both God and mammon—a seeking after truth, and a seeking after worldly wealth. The institution of technological departments largely relieved the Gardens of the latter occupation to follow the former, albeit ultimately for the benefit of the latter.

From 1922 onwards the taxonomic work of the Gardens was pushed forward. In 1922-25 Ridley, in retirement, completed his *Flora of the Malay Peninsula,* Corner's *Wayside Trees of Malaya* came out in 1940, and in 1953 and 1955 Holttum's volumes on orchids and ferns in the *Revised Flora of Malaya* were published. *The Gardens' Bulletin* is now in its eighteenth volume, and in it have appeared extensive monographs by staff members and others on gingers, figs, ferns, bamboos, palms, aroids, *Annonaceae, Myrtaceae, Myristicaceae,* and other groups of plants, and monographs on ecology. The Botanic Gardens are a major collaborator in the *Flora Malesiana* project. Work on the preparation of a revised flora on the politically defined territory of Malaya has been put aside, on the premise that the preparation of a flora for the region with natural geographical boundaries will serve a more useful benefit to Malaya. A territorial flora, if so desired, could then be prepared later with a greater degree of accuracy.

It is significant of modern administrative pressures to note that most senior officers of the Gardens have done their major writing only when relieved of office routine. Ridley wrote his five-volume *Flora of the Malay Peninsula* in retirement. I. H. Burkill wrote his monumental *Dictionary of the Economic Products of the Malay Peninsula* in the ten years following retirement. Holttum prepared the manuscript of his orchids and ferns for the *Revised Flora of Malaya* during the Japanese occupation of Singapore, 1942-45, when the enlightened Japanese directors of the Gardens gave him (and Corner) liberty from the internment camp and the free run of the Gardens' herbarium

and library. After the end of the war, with access to other herbaria and libraries, Holttum was readily able to polish up these manuscripts for publication. Even then, both were published after his retirement from the Gardens' directorship; and now he is undertaking the revision of the *Pteridophyta* for the *Flora Malesiana.* Henderson was able to prepare and publish his *Malayan Wild Flowers* only by dint of many evenings of concentrated work in the sanctuary of his bungalow where the imperious telephone and the flood of "confidential," "urgent" and "immediate" circulars could take second place.

The Gardens' horticultural work is subservient to the botanical work: the living collection of plants is the assistant to, not the master of the herbarium collection. But the public sees and enjoys the Gardens, and it is difficult to make the layman and the administrator appreciate this order of precedence. Botanical gardens are usually laid out on a compromise between scientific need and the aesthetic, and the Singapore Botanic Gardens are no exception. The Malayan flora is lacking in much that is showy. The color in Malayan gardens is introduced from abroad, and over the years many interesting and decorative plants have been introduced through the Singapore Botanic Gardens. The plant introduction books, which are preserved in the Gardens' archives, make fascinating reading. Of failures there have been plenty, through excess of zeal and expectation of too much tolerance by plants that have evolved under radically different climatic conditions. But successful introductions are too numerous to list; for example, in every town, village, and estate through the Malay Peninsula are frangipani and bougainvillea 'Mrs. Butt' and fast catching up on them are the New Guinea creeper *(Mucuna bennettii)* and *Mussaenda philippica* var. 'Dona Aurora'.

In raising improved strains of cultigens and in acclimatization, breeding is the simplest method. Unfortunately many of the plants on which one would like to work do not lead a normal full life-cycle in Malaya. They may flower but are not fertile. This precludes amelioration in all but a few groups of plants. For the past thirty-three years the Botanic Gardens have been conducting a program of orchid hybridizing, which was started by R. E. Holttum when he was Director. The success of this work has been such that the Fourth World Orchid Congress has been attracted to Singapore in 1963 to see at first hand what is being done here.

The encouragement of gardening since the inception of the Gardens has been an important function. Reference has already been made to the earliest flower shows. In later years Holttum was a founder-member of the Singapore Gardening Society and the Malayan Orchid Society, and members of the Gardens' staff have constantly taken a prominent role in their activities. Likewise the staff of the Penang Gardens, which before the war was part of the Straits Settlements Gardens Department, helped gardening in Penang and northern Malaya. Gardening is an important sociological cult. More and more people are becoming householders with small gardens; and even where there is no garden, the urge to grow things is exemplified by an increasing demand for indoor plants. With a rising standard of living and more time for leisure, the way in which leisure is spent is of the greatest importance. Though there are many desirable ways, a hobby of growing plants is surely among the most satisfying. *Mens sana in corpore sano.*

Modern society is complex, and the Botanic Gardens contribute in many ways other than those so far mentioned. A bold list would be indigestible, but its extent is fascinating. Suffice it to mention that doctors, police, and lawyers consult the staff for expert opinion on poisons, the police and customs on smuggled drugs, pharmacists on medicinal herbs and phytochemistry, traders and planters on new economic crops, assistance in introduction, and ways of harvesting. Even clerics seek assistance on the availability or substitution of requisite plants for religious purposes. And the introduction of fast and high-flying aircraft raises problems of plant quarantine, measures for the prevention of the introduction of disease, and the susceptibility of plant material to the low temperatures and desiccation of the stratosphere.

The past century has seen great advances in our knowledge, but as we learn more about the biology of our country, we also realize more fully the extent of the gaps in our knowledge. This is not a criticism of shortcomings, but a challenge to fill at least some of them in the years to come.

CRABGRASS CONTROL (Continued from page 48)

on turfgrass seed applied or at near the time of the chemical treatment. With normal rates of treatment, most chemicals permit reseeding at the close of the season. Now there are several types that can interfere for periods longer than one growing season. This is especially true of overdosage.

A Review of the Chemicals

Research has been conducted on a great variety of chemicals. Several of these have been sold rather extensively under different trade names. A few are being offered for sale with too little research. Information on some of these chemicals, as follows, provides a basis for selecting the most appropriate chemical.

Calcium arsenate has given good and long-lasting control of crabgrass. It has some features that require careful consideration before use. Its activity appears to vary greatly with the phosphorus level and possibly with other characteristics of the soil. Annual bluegrass is very sensitive to this material and may be completely destroyed. While this might be desirable for some areas, it is ruinous to the appearance of the lawn until some other species is established. Calcium arsenate is sold under various trade names and exists in varied forms. Fall and early spring applications are best. A rate of five hundred and fifty pounds per acre is most commonly used. If one decides to use this material, it is worth while to learn the tolerance of the grass species and the reaction of the chemical before treating extensive areas. Calcium arsenate is a poisonous product, highly dangerous to man and animals until it is diluted and mixed with the soil.

Chlordane has given fair to good crabgrass control, and it appears to be one of the safer materials on turfgrasses. Dry applications with clay or vermiculite carriers have been superior to spray application. Early spring application appears best. The rates of chlordane for pre-emergence crabgrass control (commonly eighty pounds per acre) are con-

siderably heavier than insecticide rates. Treatment for crabgrass control should, therefore, give good control of most soil inhabitating insects for an appreciable time. Chlordane is sold under various trade names.

Dacthal has given one of the better performances as measured by control and injury ratings. It is used at rates of ten to twelve pounds per acre and applied with a dry carrier. Early spring appears to be the best season for its application. Red fescue appears more readily injured by this substance than other grasses.

Zytron is another of the better-performing pre-emergence crabgrass herbicides. Its record of control is one of the best, and it frequently improves the appearance of the grass. However, it has injured turfgrasses on occasion, and its safety for reseeding at the close of the growing season does not appear so good as that of some other materials. It is capable of giving good control with applications made in early spring and through midspring. An application rate of fifteen pounds of actual herbicide per acre is adequate.

Arsenate of lead has been used occasionally over a period of years. It has not given consistently good control, and it is a poisonous product, dangerous to man and animals.

An arsenical complex has been sold under the trade name of "Pax." It has given some good results in the Midwest and West, but its performance has been poor in the northeastern states. It has been one of the more injurious types, and it is poisonous. A new preparation of this material is claimed to be less injurious to grass.

Calcium propyl arsonate has not given satisfactory control at the rates that have been used; also, it is not as thoroughly tested as many other chemicals.

Bandane appears similar to chlordane, except that it seems to be more effective, pound for pound. It requires further testing.

Diphenatrile has been used in field tests for three years and has been on the market for one year. It has given both excellent and poor control; the reason for its poor performance in some situations is not known. It appears to be one of the safer materials.

Trifluralin can give very effective control of crabgrass at rates of two to six pounds per acre. However, it needs more testing and is potentially injurious at the higher rates.

The Turf Grower and Pre-Emergence Crabgrass Control

Lawn owners and other turf-grass producers have used pre-emergence crabgrass control on a limited basis. The time has arrived when more will be making a decision on enlisting this type of material in the struggle with crabgrass. Many state agricultural experiment stations are not recommending pre-emergence crabgrass control; some are recommending the practice on a limited basis; and a few are recommending rather general use. This situation should convince the gardener and turf grower that he should approach the practice conservatively.

Those who use pre-emergence crabgrass herbicides should select the type of material that best fits their problems. Treatment is seldom worth while if a moderate stand of grass does not exist. Kentucky bluegrass is usually a safer grass for treatment than red fescue and bentgrass, and it may be wise to limit use of pre-emergence control chemicals to this one species. Avoid using these chemicals in shady lawn areas. And also remember that turf less than one year old offers a much greater risk.

The best chemical is useless if it is applied at the wrong season or rate. Uneven distribution can also be damaging, give poor control, or result in very poor appearance. Pre-emergence crabgrass treatments can be advised only in conjunction with first-class workmanship.

Many will still ask if pre-emergence crabgrass control is worth the effort and expense. A number of the chemicals are worth while on certain types of crabgrass problems. The turf area should have sufficient value or importance; a crabgrass problem must exist (a few scattered plants do not justify the risk); the turfgrasses must be of a tolerant type; and the herbicide must be used properly. Pre-emergence crabgrass herbicides need more study, and the user should realize there is some degree of risk, that turfgrass injury or failure to control crabgrass may occur. This new technique will be much more useful if proper maintenance is practiced. Fertilization and high mowing on a Kentucky bluegrass lawn are still good antidotes for crabgrass. When there requirements are properly met, the need for a pre-emergence chemical will be reduced and the technique will be more successful.

CROWNVETCH 'PENNGIFT'

WHAT IT IS, WHAT IT DOES

By Fred V. Grau

Dr. Grau, who is Consulting Agronomist to Hercules Powder Company, is an authority on grasses. He has been extension agronomist at Penn State University, Director of the United States Golf Association Green Section at Beltsville, Maryland, and Director of college and university relations for the Nitroform Agricultural Chemicals Corporation at Woonsocket, Rhode Island. Dr. and Mrs. Grau reside in College Park, Maryland, where they have a test nursery for turfgrasses, and they operate farms in Pennsylvania on which crownvetch 'Penngift' is produced.

Coronilla varia 'Penngift', in the few short years of its existence, has found its way into a broad category of uses over a wide climatic range. Now, twenty-six years after its discovery by the writer, and fifteen years after his first mechanical harvest of seed, it seems logical and useful to take stock of its accomplishments, and to make an informed guess about its future.

The variety name 'Penngift', is a combination of Penn for Pennsylvania, where the perennial legume was discovered and released, and Gift for the late Robert Gift of Virginville, Berks County, on whose farm this ecotype was found. According to the available evidence, a single plant developed about 1905 in a field that had been planted to imported alfalfa seed. It flourished on impoverished shale

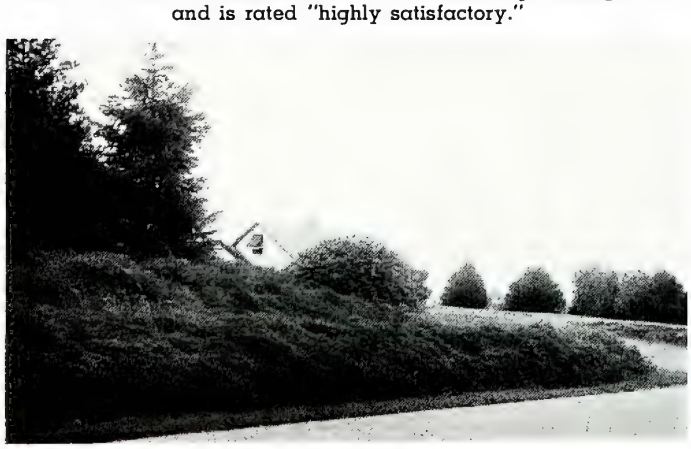
The fern-like leaves and attractive flowers of crownvetch furnish a landscape texture which is acceptable around homes.

soil and continually recurred in spite of repeated plowing, cultivation, and cropping. By 1935 an area of about ten acres, including a very steep unworkable slope, had been completely covered. It was the unusually brilliant show of blossoms on that June day in 1935 that caused 'Penngift' to be "discovered." The brilliant blossom display is an attribute that makes this groundcover one of the most popular for slope control.

The blooming period starts about mid-June in central Pennsylvania, reaches its peak in early July, then loses its brilliance as seed pods are formed. With summer rains there is profuse new green growth, which often bursts into scattered bloom in late summer and early fall. These fresh rose, pink, and whitish inflorescences are blackened when killing frosts come, after which the green topgrowth gradually loses its color but not its soil-protecting properties.

Soil and water conservation represents the greatest contribution of this legume to our economy. The deep mass of interwoven roots and rhizomes holds the soil together tenaciously. Recent investigations at Gate of Heaven Cemetery near Cincinnati, Ohio, showed 'Penngift' roots below the six-and-a-half-foot depth in heavy brick clay. Apparently no soil is too poor nor too raw to support growth, given the meager nutrient necessities. Topsoil is not only unnecessary in 'Penngift' plantings, it is undesirable. Added to the soil-holding root mass is the deep mat of tangled stems and leaves on the surface; this reduces the force of hard-driving raindrops to a gentle trickle wholly incapable of moving soil. This unique combination is at work three hundred and sixty-five days of the year—yes, even during winter dormancy.

Crownvetch 'Penngift' covers a slope too steep for mowing, in front of a home on Route 209 west of Stroudsburg, Pennsylvania, and is rated "highly satisfactory."



Crownvetch 'Penngift' can be established economically by sowing the hulled, scarified, inoculated seeds. The special bacterial culture (inoculant), which is so essential to success, is sent with the seed. Crowns (roots) also are used, especially on slopes that previously have been sown to a grass mixture and are beginning to erode. Crown-planting costs more initially, but it is favored by many home owners who have great difficulty in preparing a seedbed, inoculating the seed, and mulching with straw.

'Penngift' is finding a place on steep slopes around homes, offices, shopping centers, schools, parking lots, earthen dams, and golf courses, as well as on highways and military establishments. The verdant growth, which persists when most grasses are drought-browned, makes this plant a good fire retardant. The lacy fern-like leaves create a pleasing soft texture that home owners and landscape architects admire.

Because it has rhizomes, 'Penngift' will spread and may invade areas where it is not wanted. Control is accomplished simply by trimming, mowing, or by the use of brush-killer (2, 4-D and 2, 4, 5-T). Occasional tall-growing weeds that poke through the groundcover can be cut off to improve appearances. After the second year few weeds can survive.

Highways and military installations use crownvetch for slope protection. Such protection is important, too, on home properties to reduce maintenance problems.

Zero-maintenance most nearly describes the care of 'Penngift' crownvetch. No mowing is needed, although high mowing (four to six inches) once or twice a year can be tolerated. The initial liming and fertilizing at the time of establishment rarely need to be repeated. Some stands, fifteen to twenty years old, are still perfect without additional fertilization.

The widespread use of crownvetch on roadside slopes is being noticed by motorists who in effect say, "How I'd love to have *that* on our steep bank at home. I wonder what it is." Questions directed to seedsmen and nurserymen yield virtually a blank. Finally a call to the state highway office yields identity and a leaflet describing the plant.

(Continued on page 72)

MARCO POLOS OF THE PLANT WORLD

By GEORGE H. M. LAWRENCE

Dr. Lawrence is Director of The Rachel McMasters Miller Hunt Botanical Library of Carnegie Institute, Pittsburgh. He was formerly Director of the Bailey Hortorium, Cornell University, and is internationally recognized for his many scientific publications and for his work in horticultural nomenclature.

LIBERTY HYDE BAILEY once said so aptly, "a gardener grows plants, but a plantsman knows them." The man who knows his plants knows their cultural needs, he knows their names and identity, but more than that he knows something of their origins and heritage—and always he seeks to learn more. There is satisfaction in knowing from whence came a particular plant, in knowing how long it has been in gardens, and for what purposes it has been used. There is satisfaction in knowing who discovered a cherished plant, who introduced it, and when. The study of plant explorations, of plant explorers, and of their introductions provide fascinating episodes in our knowledge about the plants we grow and know.

The great majority of the twenty-three thousand and more species of ornamental plants grown in America today are represented by readily associated counterparts in the wild. It is only with our food plants, and with a comparatively small number of common ornamentals (such as the chrysanthemum, tea rose, tulip, gladiolus, and dahlia) that cultigens—plants unknown in the wild, the garden races, or even so-called horticultural species—have been produced through breeding and selection.

Explorations for plants have followed the opening of ocean trade routes from the shores of the Mediterranean and of western Europe. Initially these new sea lanes were charted by the Portuguese (1487 to about 1600) to exploit the spice trade between Portugal and the Orient. For all the dominance that those voyaging merchants exerted, only one plant of note was introduced by them into Europe, the sweet orange *(Citrus sinensis)* in 1545.

The Spaniards, gold-mad for treasure and loot from the New World, introduced tobacco *(Nicotiana tabacum)* from the West Indies to Spain in 1519. It came to France (by the French Ambassador to Spain, Jean Nicot, for whom it was named) in 1556, to Portugal in 1558, to Italy in 1561, and to England in 1565-73.

The lucre of the spice trade brought the Dutch into armed conflict with the Portuguese in the first half of the seventeenth century. They overthrew the Latins in many Oriental ports and established the long supremacy of the Netherlanders in Java, coastal China, and Japan.

The Dutch knew the popularity of the tulip, introduced a few decades earlier from Turkey. They had a sense of values for plants as ornamentals. They were botanists as well as horticulturists. With them began the burgeoning search and subsequent influx of ornamentals new to all of Europe. Rumphius sent back the Sago-palm *(Cycas revoluta)* from Amboina in 1660, where it had been introduced earlier from Japan. In 1680 the Dutch introduced azaleas and chrysanthemum cultivars from Japan, via Batavia. This introduction was soon lost, and a century passed before they were reintroduced, this time at Marseilles.

Although he was not an introducer of living plants, Englebert Kaempfer reported, described, and illustrated hundreds of plants that he found in Japan in the late 1600's. He sent dried specimens of them to Petiver in England. From this knowledge, men later on were stimulated to seek and introduce many of Japan's native plants.

While the Dutch were establishing and maintaining trading ports in South Africa, and the Orient, a Swede in Uppsala was training botanists, filling them with enthusiasm to explore for plants in the far-away regions of the globe. As he did so, he was also forced to seek compensation for the widows of the men he had sent out earlier, who died en route or while collecting in foreign lands. This Swede was Linnaeus (1707-78), world-famous as a physician, botanist, zoologist. Twenty-seven of his students became active explorers and collectors of plants. Peter Kalm, for whom our mountain-laurel was named *Kalmia,* explored North America (1747-51) from Ontario to Florida. Forskål, who reintroduced the calendula as an ornamental, died in Arabia from malaria. Ternström died in Cochin, China. Torén, for whom the wishbone flower was named *Torenia,* died in Canton. Löfling accompanied a Spanish expedition to Venezuela and died before he could return. Of all Linnaeus' students none was more productive as a field collector and botanist than was Carl Peter Thunberg. He served many years as a surgeon with the Dutch East Indies Company, spending three years each at the Cape of Good Hope (1771-73) and at Nagasaki, Japan (1775-78), nearly a year in Java (1774), and several months in Ceylon (1778). From all these areas he introduced many seeds, plants, and bulbs (and also several thousand herbarium specimens to Sweden). Named in his honor are the Japanese barberry *(Berberis thunbergii),* Thunberg's spiraea *(Spiraea thunbergii),* and the genus *Thunbergia,* grown widely in the tropics for its profusion of showy orange or blue flowers. Among his other introductions from South Africa are species of *Pelargonium, Gladiolus,* and *Aloë.*

The success of the Dutch attracted the mercantile interests of Britain, and resulted in the establishment of the competing East India Company, whose industry contributed to the elevation of the British to a colonial and trade dominance in the Orient that lasted for nearly two centuries. During this period (roughly 1760-1940), more plants were introduced to American gardens through the discoveries and work of the British in Asia and South Africa than by any other national group.

It was Joseph Banks, botanist on Captain Cook's first voyage (1768-71), who brought back the wax-plant *(Hoya carnosa),* our florists' hydrangea *(Hydrangea hortensis),* the privet *(Ligustrum lucidum),* the lime-berry *(Triphasia trifoliata),* and *Iris tectorum* (then known as *I. chinensis*).

The first plant collector who was sent to China by the

Royal Botanic Gardens at Kew, was William Kerr who, in 1804, sent back the double-flowered orange *Kerria,* the tiger lily *(Lilium tigrinum),* the more hardy *Camellia sasanqua,* the gardenia, *Nandina domestica,* and the Chinese juniper—all before 1814.

Two officials of the East India Company, John Reeves (1774-1856) and his son John Russell Reeves (1804-77), sent back many of our more commonly cultivated plants. Notable among them are the Chinese wisteria, cultivars of *Camellia reticulata* (brought to England by a Capt. Rawls, generally credited as the introducer), many cultivars of Japanese maple, of *Dendrobium nobile,* of rose-of-Sharon (*Hisbiscus syriacus),* and of the soybean.

During this early period, one Englishman, by the name of David Douglas (1798-1834), came to America as a plant collector; first to the Northeast in 1820, which he found dismally unrewarding, then to the Pacific Northwest and Hawaii. Although botanists have waged nomenclatural strife over the determination of its correct Latin name, no body of men can designate the Douglas-fir by any other common name; timber tree of world economic importance, named for David Douglas. The published journal of Douglas is read and reread by every lover of western American plants. It was Douglas who introduced seeds of the Lambert pine *(Pinus lambertiana)* and the Noble fir *(Abies procera)* to England. It was he who sent back seeds of clarkias, of California-poppy *(Eschscholtzia),* of many species of *Penstemon,* and of the monkey-flower *(Mimulus).* It was Douglas who was killed (and presumed murdered) while searching for new plants on a tree-fern–studded mountain slope on the Island of Hawaii.

Termination in 1842 of the Opium War between England and China, which was brought on by Britain's illicit traffic in opium from India to China, established the Crown Colony of Hong Kong and reopened Chinese ports to world trade. It also opened the door for the British introduction of tea plants from China to India. The year 1843 signaled the start of plant exploration by professional collectors, for it was then that Robert Fortune (1812-80) made the first of many expeditions to China, sponsored initially by the Royal Horticultural Society. His first trip was to Chusan from whose gardens and periphery he sent back many plants now common in our gardens. Among them are the autumn-blooming Japanese anemone, the honeysuckle's relative *Weigela rosea,* jasmine, and such conifers as the Sawara cypress *(Chamaecyparis pisifera), Cryptomeria japonica,* and the golden-larch *(Pseudolarix kaempferi).* Added to these were many cultivars of the tree peony and of pom-pom chrysanthemums. Some have credited him with the introduction, on this trip, of the gold-banded lily *(Lilium auratum),* but this species was introduced a few months earlier by Veitch.

The East India Company returned Fortune to China in 1848, specifically to introduce seeds and live tea plants to India. The exploits leading to his ultimate success (in violation of Chinese restrictions) provide fascinating reading. In 1853 he was sent to Formosa from which he introduced the pink-flowered *Lilium japonicum* and the rice-paper plant *(Tetrapanax papyriferum).* Five years later he was commissioned by the United States Department of Agriculture to collect Chinese plants, and among these were the balloon flower *(Platycodon grandiflorum)* and the bleeding-heart of our northern gardens *(Dicentia spectabilis).* From Fortune's last trip to the Orient (Japan, 1860-61) we have four important ornamentals: the holly-leaved osmanthus *(O. ilicifolius),* the Japanese umbrella-pine *(Sciadopitys verticillata),* the double-flowered form of *Deutzia scabra,* and *Primula japonica.*

The generation after Fortune brought the shy Scotsman George Forrest (1873-1932) and two Englishmen—E. H. Wilson (1876-1930) and Reginald Farrer (1880-1920). Of the three, Forrest was the most devoted to botany, collecting over thirty thousand herbarium specimens in western China and discovering there more than twelve hundred species new to science.

Forrest's introductions were largely as seeds, of which he sent thousands of packets back to the Edinburgh Botanic Garden. From them came such garden prizes as *Incarvillea delavayi,* the Chinese forget-me-not *(Cynoglossum amabile),* many primulas including *P. bulleyana, P. beesiana,* and the lythrum-like *P. littoniana.* He introduced large numbers of gentians and rhododendrons, but mostly of species not hardy in our rugged northeastern climate. The armchair explorer will find fascinating the anecdotes of Forrest's exploits as reported by E. H. M. Cox in his excellent work *Plant-Hunting in China* (1945).

Ernest H. Wilson, sometimes known as "Chinese" Wilson, was a good botanist and a better horticulturist. His introductions of plants new to our gardens number in the hundreds. He made many plant-collecting expeditions to the Orient, one to South Africa, and another to Australia and New Zealand. When we admire the beauty-bush *(Kolkwitzia amabilis)* in full bloom, we have Wilson to thank for it, and the same is true for the butterfly-bush *(Buddleia davidii magnifica),* for the increasingly popular dwarf Korean box *(Buxus microphylla koreana),* the Korean lilac *(Syringa velutina),* the over-rated dove-tree *(Davidia involucrata),* and the violet-flowered shrubby hydrangea *(H. sargentiana).* But for far more than for these, Wilson will be remembered as the introducer of oriental lilies: *Lilium davidii, L. willmottiae, L. sargentiae,* and the somewhat tender *L. formosanum.* Other lilies, too, were discovered and introduced by him, but had he found and brought us nothing more than the regal lily *(L. regale),* Wilson would ever be remembered gratefully by plantsmen for this discovery. His exploit in gathering seed of this lily cost him a leg-fracturing accident hundreds of miles from any medical help, and left him with a conspicuous limp for the remainder of his life.

The contributions to our knowledge of the flora of southeast Asia by French missionaries are considerable. They discovered many plants now important in our gardens, although in most instances they cannot be credited with the actual introduction. The work of Abbé David (1826-1900) led that of all the others. It was he who first discovered, and pointed the way for plant collectors to bring back the dove-tree, the blue poppy, the now popular *Primula malacoides,* and *Incarvillea delavayi.* Frère Paul Farges (1849-1912) discovered and described many new species of *Rhododendron,* but is to be remembered most for his report of the giant lily, *Cardiocrinum giganteum yunanense* and for *Incarvillea grandiflora.*

Reginald Farrer was a horticulturist's collector, always keen to pick and chose items that he believed suited for Britain's gardens—especially for rock gardens. His work was more in central Asia, in northern Burma, and in Nepal than in China. The sweet-scented *Viburnum fragrans* is one of his outstanding introductions, with the yellow-flowered climber, *Clematis tangutica,* a close second. It was Farrer, too, who gave us *Lilium centifolium* and the dwarf spurless columbine *(Aquilegia ecalcarata).* His name is commemorated in the large-flowered, dwarf perennial aster, *A. farreri.*

Francis Kingdon-Ward, (1885-1958) spent many decades in the hills of Assam, Burma, Bhutan, and Tibet, and collected widely in the valleys and on the slopes of the Himalayas. His knowledge of the geography of these regions and of many of their dialects made significant his contributions to allied efforts in World War II. Just as Wilson's fame is greatest for his discovery of the regal lily, doubtless Kingdon-Ward's fame is for his introduction of the blue-poppy *(Meconopsis betonicifolia).* Next in importance may well be his introduction of the lovely robust *Primula florindae* and *Buddleia alternifolia.* Less hardy for our gardens are his rhododendrons, popular in Britain and the Pacific Northwest, notably *R. wardii, R. imperator, R. myrtilloides,* and *R. venator.* Kingdon-Ward's adoption of Oriental ways carried him to conversion to Buddhism early in his career, the only one of the leading plant explorers to change his religion.

The United States can point pridefully to its contributions to the ranks of explorers for plants new to our gardens and to our crop-producing areas. David Fairchild (1869-1954), founder of what is now the United States Bureau of Plant Introduction, is remembered for his many introductions of tropical food plants. Among them was the mangosteen *(Garcinia mangostana),* which he described as having the texture of baked custard and the combined flavor of the pineapple, the apricot, and the orange; also the calamondin *(Citrus mitis),* the sausage-tree *(Kigelia pinnata),* Bohemian horse-radish, Peruvian alfalfa, and scores of cultivars of the mango.

Frank N. Meyer (1875-1918), Dutch by birth, American by adoption, collected many years in northern Asia for the United States Government. Among the ornamentals that he sent back are the now popular tartarian maple, *Acer ginnala,* the very hardy dwarf *Prunus tomentosa,* and *Viburnum macrocephalum.* Wilson Poponoe, protegé and colleague of Fairchild, also worked for the United States Government and is responsible for the subsequent establishment of the date industry in California, of suitable species and cultivars of the fig, and the avocado, and for many new members of the citrus family.

The parade continues. Collectors of the United States Department of Agriculture are active in the field. Among them are John Creech, whose hundreds of introductions of chrysanthemums, azaleas, camellias, and other plants from Japan are yet to reach the market; and Fred Meyer, currently collecting in Ethiopia. In addition, Mulford Foster has brought hundreds of new bromeliads and other tropical American ornamentals to plantsmen in the last three decades. Joseph Rock, now retired and living in Hawaii, devoted a half-century to plant collecting in the Orient and is remembered for bringing to America the chaulmoogra-oil tree which is used in combating leprosy.

These then are some of the "Marco Polos" of the plant world; men who spent years away from home, some dying at their work; men whose efforts are rewarded by the appreciation of us plantsmen who grow, enjoy, and know the fruits of their labors.

GUARDIANS OF THE PAST

By HAROLD A. HANSEN

Mr. Hansen is advisor in tropical horticulture with the United States Operations Mission to Brazil and is stationed at Belém. There he has opportunity to engage in one of his hobbies—studying the "flora of buildings."

ONE OF THE SEVERAL hemiepiphytic fig trees that are called, in Brazil, "mata-paus," or tree-killers, is *Ficus pertusa,* a member of the Mulberry Family. Excrements, containing seeds of figs on which a bird or fruit-eating bat has fed, are deposited in the fork of a tree. After germination, as the fig stem grows upwards, its root forms a broad plate if the tree is big, a sheath or pseudo-trunk if it is slender; then it develops downwards, branching out laterally, at times forming a complete network, as it seeks the ground. Richard Spruce[1], observing the behavior of fig trees on both the eastern and western foothills of the Andes, states that, "In the plain of Guayaquil, figs are the giants of the forest; and it is notable that when they grow upon any exogenous tree, they soon squeeze it to death; but if on a palm, the latter resists the pressure, and seems mostly to live out the natural term of its existence. There is a notable *Attalea,* in particular, which is often seen growing (as it were) out of a giant fig tree, but in reality the fig has grown on the palm."

A fig tree supplanting a host, in this case a Jamaican cotton-tree, is described by R. C. Alexander[2] as follows: "A small plant of a fig establishes itself in a rent or fork of the cotton-tree, and throws down a root to the ground, which becomes stretched as taut as a violin-cello string, and carries up nutriment to the little parent plant above, which drops stronger and larger and more numerous roots till it has enveloped the cotton-tree and choked it; and insects do the rest."

While figs, then, are well known as stranglers of trees, and while some do considerable damage to buildings by the entrance of their roots into cracks in the masonry, they do at times prevent the disappearance of ruins which would, were they left to the mercy of man or to the destructive forces of a humid tropical climate, completely vanish. The two fig trees that are here illustrated, both of which are identified as *Ficus pertusa,* have protected, within a firm

1. Richard Spruce. **Notes of a Botanist on the Amazon and Andes, I and II.** MacMillan and Co., London, 1908.
2. **Hooker's Journal of Botany.** 1850.

network of inosculated roots, the remains of a gracefully designed chapel and the chimney of a nearby sugar mill.

The chapel and the mill chimney, which stand on the bank of Rio Murutucú within the grounds of the Instituto Agronômico do Norte, Belém, belonged, in the eighteenth century, to the Carmelite Missionary Order. The chapel at least is the work of the talented Italian architect Antonio Giuseppe Landi and is, moreover, though not mentioned by Germain Bazin in his monumental work[3], one of the finest examples of the rococo-neoclassical transition architecture of which Landi was the first exponent in Brazil.

Landi, who was born in Bologna in 1708, studied in his native city under Ferdinando Galli de Bibiena, a famous architect and scenic designer. He became a professor at the Institute of Science and Arts in Bologna and, in 1739, was elected a member of the Academia Clementina. In 1753, after his appointment by King João V of Portugal to the frontier demarcation commission established as a result of the treaty of Madrid in 1750, he arrived in Belém and went from there to Manaos. Though not lacking in talented members (apart from Landi, the two astronomers João Angelo Brunelli and Miguel Antonio Ciero, captains of engineers Henrique Antonio Gallucio, Gaspar João Geraldo Gronfelts, and Domingos Sambucete, the surgeon Antonio de Mattos, and sergeant-major Sebastião José da Silva), the commission returned from the interior without having completed its work, which was to establish the boundary between New Spain and the Portuguese possessions. Landi was on the point of embarking for Europe when, in 1759, the then governor of Grand Pará, Manoel

3. Germain Bazin. **L'Architecture religieuse baroque au Brésil**, I and II. Librairie Plon, São Paulo and Paris. 1956.

Ficus pertusa, above and right, has prevented the disappearance of the chimney of a sugar mill and the remains of a chapel on the bank of Rio Murutucú within the grounds of the Instituto Agronômico do Norte, Belém.

Bernardo de Mello e Castro, commanded him to draw the plans for "uma casa decente, sem superfluidades, para residência dos governadores."

In 1761 he married into an old local family, and during the remaining twenty-nine years of his life he remained in Belém, active not only as an architect, but as a naturalist and cartographer[4] in the service of the colonial government. Besides Government House, he designed the facade of the cathedral of Belém and drew the plans of several churches still standing. A theater that he designed in 1775 was demolished in the nineteenth century and other buildings of his are either abandoned and ruined, or have entirely disappeared. The whole magnitude of his work may never be known, but much information about him and some excellent descriptions and water-colors of his work, made by the Brazilian naturalist Alexandre Rodrigues Ferreira in the late eighteenth century, are preserved in the National Library in Rio de Janeiro and are now in the process of publication.

Undoubtedly, in the history of Brazilian architecture, Landi deserves a far higher place than he has been accorded so far. As Bazin writes in discussing the impact of Landi's work on Belém: "L'absence de toute tradition, renforcée par la venue d'un artiste étranger, allait faire de l'une des villes les plus éloignées et les plus provinciales du Brésil la cité la plus moderne du Vice-Royaume avec Rio."

The two fig trees will have done good service when some future historian of Brazilian architecture writes for Landi the literary monument he so well deserves.

For permission to use the illustration photographed by Otto Penner, I thank Dr. José Maria Pinheiro Condurú, Director of the Instituto Agronômico do Norte.

4. It was in 1784, during a second survey and boundary demarcation expedition that Landi contracted a tropical disease which caused his death six years later.

ROLAND W. BROWN, 1893-1961

By HERMAN F. BECKER

Dr. Becker is Research Associate of The New York Botanical Garden.

WITH THE UNTIMELY death of Roland Wilbur Brown, paleobotany has lost one of its great men. Dr. Brown died on December 21, 1961, at Lehighton, Pennsylvania, from a heart attack, probably aggravated by excess woodchopping for his fireplace. He was born at Weatherly, Pennsylvania, on May 12, 1893. He retired in 1958 in order to enjoy his new ranch-house in the rolling Pennsylvania hills, with its picture-window vistas over the valley, hills, a meadow, and a stream.

Brown served the United States Geological Survey for nearly thirty years as curator of fossil plant collections, being finally geologist and chief Tertiary paleobotanist of the Survey at the National Museum in Washington, D. C. His painstaking care has made this collection the finest and most extensive in the country, especially in conjunction with the unsurpassed paleobotanical library and the compendium index.

Brown was the author of a score of significant papers,

Roland W. Brown, 1893-1961.

and his treatment of the Green River flora especially has added immensely to our knowledge of Tertiary plants. As a scholar of languages, he published in 1954 his *Composition of Scientific Words*. This classic in etymology is widely used by geologists, zoologists, botanists, and paleontologists.

Brown received his doctorate in paleobotany from Johns Hopkins University in 1926; he had previously taught at Yale University, and was a member of the Washington Academy of Sciences and several other prominent organizations. His library reflected a man of high culture with a wide interest in the sciences, philosophy, and classical as well as current literature.

I made Dr. Brown's acquaintance about eight years ago, and this developed into a cordial mutual friendship. "Brownie," as he was affectionately called by his more intimate friends, never wanted to die with his "boots on." On the day of his retirement he locked his desk, returning only once to receive a citation for distinguished service.

Those who knew him well understood his somewhat unusual character. He was a bachelor, and completely self-sufficient, somewhat shy in relations with his fellow men, frugal, thrifty, and irreproachably honest and trustworthy. "Brownie" saved string and often wrote a letter on any old sheet of paper, trimming it to size, but he contributed magnanimously thousands of dollars to hospitals and philanthropic endeavors. As an intermittent guest at his home and through lively correspondence, I learned to appreciate the individualistic traits of this modest man and front-line professional paleobotanist. In my own ABC and D of the deans of paleobotany in the United States, the B stands for Brown, the other letters for Arnold, Chaney, and Dorf.

In his earlier years, Brown tried to start a movement to omit Latin endings from specific names, and several species bearing his authorship will testify to this experiment. Needless to say, this innovation fell on barren ground.

Brown was the first to discover two species of the now Asiatic *Eucommia* in the fossil western record. Subsequently I found in the Ruby flora yet another species of the same genus; when I showed it to Brown, he considered it

only a size-variation of his own material. Upon description and publication of what I had good reason to term a new species, naming it *Eucommia browni* in his honor, his comment was very favorable. He happily conceded that the new characteristics were at variance with his own fossil. He put his entire Ruby flora fossil collection at my disposal for inclusion in my own work, depriving himself of the prerogative to use it in his contemplated Basin Floras of the West, which, alas, never materialized.

Brown's memory will be kept alive through his unparalleled work, through references found in almost all contributions to the field, but above all his spirit will live among his friends and admirers.

CROWNVETCH 'PENNGIFT' (Continued from page 66)

Repeated experiments and field trials indicate that solid cover from seed can be accomplished at the end of the second growing season. Under favorable conditions solid cover has been obtained in the year of seeding. Hulling and scarifying the seed permit germination in seven to ten days. Topgrowth is slow for several weeks after that, because the plant is developing a root system that will carry it through unfavorable periods. Sowing the freshly inoculated seed on the surface of limed, fertilized soil is the best procedure. The only covering should be about an inch of straw mulch (one to one and a half bales to one thousand square feet or one to two tons to the acre) anchored to prevent movement.

Some "failures" have been traced to the use of the wrong fertilizer, sowing ten times too much companion grass, improper or no inoculation, and omission of limestone. Directions are made to be followed—but they are often ignored.

The future of 'Penngift' lies in the realm of zero-maintenance, of effective control of erosion and weeds, and of providing beauty with utility. It will play a significant part in watershed projects as well as in the nation's system of highways. Limited work indicates high feeding value for livestock. As a soil-improver it has no equal. Earthworms of great size wax fatter in the cool moist climate below the mat. Vegetables grown on 'Penngift'-improved soil seem sweeter. Insects tend to avoid the crops. Great quantities of nitrogen from the air are converted by the nodule-bacteria for use by other plants.

Types of 'Penngift' may be developed that will have special flower color or dwarf stature, and these may be more desirable around home sites. Airports and large turfgrass areas soon may incorporate crownvetch as the nitrogen-gathering component of the sward to reduce maintenance costs under a system of infrequent high cutting, or simple rolling to keep vegetation low without mowing.

Wide adaptation to soils and to climates characterizes 'Penngift' crownvetch. From Georgia to Maine and from New Jersey to California, it is performing well in extremely difficult situations. In areas of long droughts some supplemental irrigation is needed to keep it green. It appears to have a place in erosion control along our shorelines. Certainly our water resources can be improved as this legume is used more widely.

All back issues and reprints of back issues of *Addisonia, Brittonia, Economic Botany, Memoirs of The New York Botanical Garden, Mycologia, and North American Flora* are handled exclusively by Stechert-Hafner, 31 East 10th St., New York 3, N. Y. All inquiries should be addressed to that company.

Stechert-Hafner also sells the following books published for The New York Botanical Garden at these list prices:

Britton: *Flora of Bermuda*		$10.00
Britton and Millspaugh: *The Bahama Flora*		9.50
Gleason: *Plants of the Vicinity of New York*		4.50
Gleason and Collaborators: *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada**	3 vols.	35.00
*Family Keys from New Britton and Brown Flora**		1.00
Hagelstein: *The Mycetozoa*		7.50
Mackenzie: *North American Cariceae*	2 vols.	20.00
Keys to the North American Species of Carex		Price on request
Rydberg: *Flora of the Prairies and Plains of Central America*		8.50
Van Melle: *Review of Juniperus Chinensis et al*		1.50

*This work may also be purchased from The New York Botanical Garden. There is a handling charge of $1.00 on The New Britton and Brown Flora.

Subscriptions to the following periodicals should be sent to The New York Botanical Garden.

Addisonia, colored plates of flowering plants accompanied by non-technical descriptions; 8 plates to a part, 4 parts to a volume. Published one part annually. Free to members of the Garden; $10.00 per volume to others.

Brittonia, published quarterly for the American Society of Plant Taxonomists. Subscription included in the Society's dues $6.50 a year. $7.50 per volume to others.

Economic Botany, official organ of the Society of Economic Botany, published quarterly. Members' subscription included in Society's dues $7.50 a year. Subscription to non-members $8.00 a year.

Memoirs of the New York Botanical Garden, scientific papers by members of the staff and collaborators; issued irregularly. Vol. 10, $10.00. Prices of earlier volumes on request.

Mycologia, official organ of the Mycological Society of America, published bi-monthly. Members' subscription included in Society's dues $8.00 a year. Subscription to non-members $10.00 a year with Vol. 54, 1962.

North American Flora, descriptions of the wild plants of North America, including Greenland, the West Indies, and Central America. 100 parts issued; now in 2nd series. Prices of parts on request.

The Garden Journal, non-technical articles on botanical, horticultural, and kindred subjects, published bi-monthly. Free to members of the Garden. Subscription $3.00 a year (foreign $3.50) to others.

Back issues of The Garden Journal, 75¢ each, and of The Journal of The New York Botanical Garden, 50¢ each, are available from The Garden.

THE NEW YORK BOTANICAL GARDEN
BRONX PARK NEW YORK 58, N. Y.

BRIEF NOTES ON RECENT BOOKS

By ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

GENERAL GARDENING

CONCISE GARDEN ENCYCLOPEDIA. Bishop, Bernard W. 190 pages, illustrated, indexed. Philosophical Library, New York. 1961. $4.75.

An English title of little value to American gardeners with too many general statements resulting in misleading information.

THE GREEN THUMB GARDEN HANDBOOK. Abraham, George. 344 pages, illustrated, indexed. Prentice-Hall, Englewood Cliffs, N. J. 1961. $4.95.

A compendium of useful indoor and outdoor gardening information for the not-too-advanced gardener by the writer of the syndicated garden column, "The Green Thumb," originating in up-state New York.

MIRACLE GARDENING ENCYCLOPEDIA. Baker, Samm S. 406 pages, illustrated (part colored), indexed. Grosset and Dunlap, 1961. $5.95.

A chatty, verbose miscellany of "miracle" gardening practices.

TRAINED AND SCULPTURED PLANTS: A HANDBOOK. 65 pages, illustrated. Brooklyn Botanic Garden, Brooklyn, N. Y. 1961. Paper, $1.00.

This excellent addition to the popular handbook series contains contributions by fifteen well-known authorities on the many phases of the training and shaping of plants, including pruning, pleaching, espalier, and topiary.

SPECIAL KINDS OF PLANTS

DAHLIAS FOR EVERYONE. Lebar, T. R. H. 208 pages, illustrated (part colored), indexed. St. Martin's Press, New York. 1961. $3.95.

Written primarily for the British amateur gardener, these cultural instructions do not always apply to American practices and may prove misleading to gardeners in this country.

DELPHINIUMS FOR EVERYONE. Ogg, Stuart. 96 pages, illustrated (part colored), indexed. Branford Co., Newton, Mass. 1961. $2.95.

Another good little book, written in England, by an Englishman for gardeners in Great Britain. The methods of growing delphiniums in England is markedly different from those in our country.

GROUNDCOVERS FOR EASIER GARDENING. Foley, Daniel J. 224 pages, illustrated (part colored), indexed. Chilton Co., Philadelphia. 1961. $5.50.

The fascinating diversity of groundcovers which Mr. Foley recommends should offer solutions to many garden-upkeep problems. Some of the types listed are: paving plants, seaside plantings, moist, dry, acid, and shade-tolerant subjects.

HERBS: HOW TO GROW AND USE THEM. Doole, Louise E. 128 pages, illustrated, indexed. Sterling Publishing Co., New York. 1962. $2.50.

A chatty breezy, practical guide for the amateur, written by the assistant editor of *The Nebraska Farmer*, who is an ardent herb grower with ideas galore for potpourris, herb baths, herb sugars, herb vinegars, herb teas, and so on.

HOW TO GROW AFRICAN VIOLETS; 2nd ed. (A Sunset Book) Rector, Carolyn K. 62 pages, illustrated, indexed. Lane Book Co., Menlo Park, Cal. 1961. Paper, $1.50.

An excellent revised, enlarged, and updated edition by the author of *African Violet Variety List*, which is also a most creditable work.

IRIS CULTURE AND HYBRIDIZING FOR EVERYONE. Vallette, Wilma L. 403 pages, illustrated. Adams Press, Chicago. 1961. $5.75.

According to the author, this is the first book on iris ever written by over three hundred people, living in forty-seven states of the continental United States, and also the first iris book written with a special slant towards hybridizing. Much of the contents is based on the American Iris Society "Round Robins" (letters to and from members).

THE KITCHEN GARDEN BOOK. Barr, Stringfellow and Stella Standard. 480 pages, indexed. (Dolphin Handbook) Doubleday and Co., Garden City, N. Y. 1961. Paper, $1.45.

A popular gardening-cook book, originally published in 1956, in a paperback edition.

MUSHROOM GROWING TODAY; 4th ed. Atkins, Frederick C. 186 pages, illustrated, bibliography, indexed. Macmillan Co., New York. 1961. $5.00.

An authoritative text written by an English mushroom grower. Emphasis is placed on the commercial aspects, but there is a chapter devoted to "mushrooms for the amateur gardener."

RHODODENDRONS OF THE WORLD AND HOW TO GROW THEM. Leach, David G. 544 pages, illustrated (folding chart in color), bibliography, indexed. Charles Scribner's Sons, New York. 1961. $25.00.

This imposing quarto, with a most comprehensive text and with illustrations by the internationally known sculptor and rhododendron fancier, Edmond Amateis, represents a stupendous task of observation and research in the history, nomenclature, culture, and hybridizing of rhododendrons.

SPICES AND HERBS AROUND THE WORLD. Hayes, Elizabeth S. 266 pages, illustrated (col. front.), bibliography, indexed. Doubleday and Co., Garden City, N. Y. 1961. $5.95.

Mrs. Hayes has given us a delightful blending of history plant lore, and cultural directions, with generous sprinklings of intriguing recipes.

SOILS AND FERTILIZERS

EARTH: THE STUFF OF LIFE. Bear, Firman E. 238 pages, bibliography, indexed. University of Oklahoma Press, Norman, Okla. 1962. $3.95.

It is a rare privilege to read such an informative and entertaining book, in lucid, understandable language. This is from the pen of one of our most eminent soil scientists. The importance of soils to plant life and their conservation is the dominant theme.

AN ESSAY ON CALCAREOUS MANURES. Ruffin, Edmund. Ed. by J. Carlyle Sitterson. 199 pages. The Belknap Press of Harvard University Press, Cambridge, Mass. 1961. $4.25.

"With the publication in 1832 of his first book, *An Essay on Calcareous Manures*, Edmund Ruffin, an obscure Virginian, initiated an era of agricultural reform in the Old South"—so begins the editor's biographical and historical introduction to this reissued classic, the original edition of which has long been a collector's item.

SOIL CONDITIONS AND PLANT GROWTH. Russell, E. John. 9th ed. by E. Walter Russell. 688 pages, illustrated, indexed. David McKay Co., New York. 1961. $12.50.

A greatly revised and expanded new edition of an authoritative work, world-wide in scope, by the son of Sir John Russell.

GARDEN STRUCTURES AND ORNAMENTS

THE FEATURE GARDEN. Fletcher, H. L. V. 142 pages, illustrated. Charles T. Branford Co., Newton Center, Mass. 1961. $3.50.

In addition to plants, a garden often needs embellishments and objects of interest and usefulness. A variety of ideas and how-to-do-it-yourself suggestions for pools, paths, fountains, sundials, bird-baths, steps, seats, arbors, summer houses, hedges and topiary work are to be found in this little book, originally published in England in 1960.

GARDEN WOODWORK; GREENHOUSE, SHEDS, SEATS, BEACH CHALET, SWING, GATES, FRAMES, CYCLE SHED, GARAGE, POULTRY HOUSE, PIGEON COTE, ETC. Hayward, Charles H., ed. 157 pages, illustrated. J. B. Lippincott Co., Philadelphia. 1961. $3.75.

Another British book dealing with garden structures. The carpenter's detailed plans should be most helpful.

SUNSET IDEAS FOR BUILDING BARBECUES. Editors of Sunset Books and Sunset Magazine. 72 pages, illustrated, Lane Book Co., Menlo Park, Cal. 1961. Paper, $1.50.

Photographs, plans, diagrams, sketches, and very clearly written text combine to make this an indispensable guide.

PLANT PESTS

THE MITES OF STORED FOOD. Hughes, Agnes M. 287 pages, illustrated, bibliography, indexed. (Tech. Bull. No. 9. Great Britain Min. Agric.) dist. by British Information Services, New York. 1961. $3.30.

Mites play no small role in the destruction of food. Dr. Hughes of Britain's Infestation Control Laboratory presents a technical descriptive text with identification keys and over three hundred and fifty line drawings.

(Continued on page 77)

NEWS, NOTES and COMMENTS

Honors to Members of the Garden. The George McAneny Medal for conservation in the field of history has been presented to Mrs. Paul Moore of Convent, New Jersey, a Fellow for life of The New York Botanical Garden for her work at the National Historical Park in Morristown, New Jersey. This is an annual award of the American Scenic and Historic Preservation Society. Mrs. Arthur Hays Sulzberger, a member of the Garden's Board of Managers, received the Society's citation of merit for her efforts to preserve the Grange, the eighteenth-century home of Alexander Hamilton on Convent Avenue, New York City. Another member of the Garden, Edward J. Grassmann, of Elizabeth, New Jersey, received a citation of merit for the purchase and restoration of the residence, in his city, of Jonathan Belcher, Royal Governor in 1751.

Fellowship for Graduate Study. The New York Botanical Garden is offering several graduate fellowships in systematic botany and related fields. Appointments will begin July 1, 1962, or September 1 by special arrangement. Each fellow is expected to devote half time to graduate study leading to a Ph. D. degree at Columbia University, Fordham University, or other associated institutions, and half-time to assistance in the Herbarium and to special assignments in systematic, floristic, phytogeographic, and ecologic researches in progress at the Garden. There is usually opportunity for a fellow to participate in one or more of the Garden's tropical expeditions.

The fields of research at the Garden and their directors are: taxonomy of vascular plants (especially of North America), Dr. Arthur Cronquist; plant ecology, biogeography, biosystematics, Dr. Pierre Dansereau; plant physiology (growth and development), Dr. Richard M. Klein; taxonomy and geography of vascular plants (especially of the neotropics), Dr. Bassett Maguire; plant pathology, Dr. P. P. Pirone; history, nomenclature, and bibliography, Dr. Harold W. Rickett; taxonomy of economic plants, Dr. David J. Rogers; taxonomy of non-vascular plants (especially of fungi), Dr. Clark T. Rogerson; and taxonomy of the bryophytes and bryogeography, Dr. William C. Steere.

The fellowship stipend is $2,700 a year, with a month's vacation allowed, and tuition payments required by the university paid in full by the Garden. The fellowship may be renewed annually.

Appointments will be made April 1, 1962, on the fellowship nominations or applications filed by March 1, 1962.

National Science Foundation has made a grant to The New York Botanical Garden for publication of Dr. Rudolf Schuster's work on the *Hepaticae* and *Anthocerotae* of eastern North America, in a series of five to seven parts. This represents the most substantial work on liverworts in this country during this century.

The Fossil Plant Collection at The New York Botanical Garden has been augmented by three hundred and eighty-four specimens received from James Orr, geologist at the University of Chicago. These Tertiary fossils from the Grasshopper Basin near Grant, Montana, add to the five hundred fossils collected partially by Mr. Orr and Dr. Herman F. Becker during the summer of 1961, and represent a new flora.

Activities of the Director and Staff. Within the past two months, Dr. William C. Steere, Director, has attended meetings of the Long Range Planning Committee, American Institute of Biological Sciences, at Stanford University; of the Executive Committee of the A.I.B.S. Biological Sciences Curriculum Study, in Chicago; of Commissioner Allen's Committee on Museum Resources, in New York City; on A.I.B.S. Film Series in Kansas City; of an ad hoc committee on the Botanic Museum of Harvard University in Cambridge; of the Executive Committee of A.I.B.S. in Washington, D.C.; the annual conference of Biological Editors in New Orleans, followed by the meeting of a committee to consider the prospect of a botanic garden in New Orleans. Dr. Steere lectured on "Flowers of the Tundra" before the Pennsylvania Horticultural Society, in Philadelphia; and introduced Dr. G. H. M. Lawrence, Director of the Rachel McMasters Miller Hunt Botanical Library, when he appeared on the Downtown Lecture Series sponsored by the Volunteer Associates.

Dr. Pierre Dansereau, Assisant Director (Botany) and Senior Curator, lectured before the Biology Department at Fordham University and was a guest speaker at the Botany Department of Columbia University. He also lectured at the University of Florida and addressed a seminar at the Fairchild Tropical Garden. While in Florida, Dr. Dansereau engaged in field work with Dr. Harry Tomlinson, Research Scientist for the Alice Hawkes Science Laboratory of the Fairchild Tropical Garden. He visited Sandy Hook, New Jersey, with Dr. Calvin Heusser of the American Geographical Society and two young geologists from Columbia University.

T. H. Everett, Assistant Director (Horticulture) and Curator of Education, addressed the Denver Garden Club on the afternoon of February 13, 1962, and the members of the Denver Botanic Gardens and their guests on the evening of February 14, 1962. While there, he consulted with Dr. A. C. Hildreth, Director, on the development of the Denver Botanic Gardens.

Dr. Harold Rickett, Bibliographer and Senior Curator of the Library, is giving a series of eight lectures on "Elements of Botany" (a non-technical approach for gardeners). The series, which started on February 23, sponsored by the Garden and Conservation Department of the Woman's Club of Englewood and the Horticultural Committee of the Garden Club of Englewood, New Jersey, and is being held in that community.

This is the second extension course given as part of the Garden's Educational Program. Last spring, at the invitation of the Garden Club of Englewood and the Garden Department of the Woman's Club of Englewood, Mr. Everett gave a series of lectures on "Fundamentals of Gardening" at the Woman's Club in that community.

Dr. P. P. Pirone, Senior Plant Pathologist, contributed the chapter on insect pests and diseases to *The Peonies*, edited by Dr. John C. Wister, and published by the American Horticultural Society. Dr. Pirone conducted a one-day school on arboriculture for the Department of Parks of New York City.

Dr. Arthur Cronquist, Curator, has been elected President of the American Society of Plant Taxonomists. He lectured before the Biological Club of City College and gave a course, on three successive Thursdays in January, 1962, in "Plant Identification Botany" at the Greenwich Garden Center, located on the former Montgomery Pinetum in Cos Cob, Connecticut. Dr. Cronquist is collaborating with Dr. H. A. Gleason, Curator Emeritus, in the preparation of a book on "Introduction to Plant Geography" for those who are not professional botanists.

Dr. Herman F. Becker, Research Associate, arranged an educational exhibit on a phase of paleobotany for the Biology Department of Brooklyn College. He and Dr. Cronquist took Dr. Warren H. Wagner, of the University of Michigan, who was studying at the Garden and seeking fern fossils, to the classical locality for *Aneurophyton* along the banks of the Delaware near Sparrowbush, New York.

Dr. Clark T. Rogerson, Curator of Cryptogamic Botany, gave a talk on "The Genus *Hypomyces*" at the February meeting of The New York Mycological Society.

Mary Fleming, Technical Assistant in the Cryptogamic Herbarium, gave a talk on "Introduction to the Use of Microscope in Mycology" at the first meeting of The New York Mycological Society, held on January 20, 1962, at the garden.

Henry Fleming recently joined the staff as Research Associate to assist Dr. David J. Rogers, Curator of Economic Botany, in investigating "The Use of Computers in Marine Alga Taxonomy" under a contract from the Office of Naval Research. Mr. Fleming was formerly with The New York Zoological Society for twenty years.

Mr. and Mrs. Fleming are co-chairmen of the Rhododendron Garden to be exhibited at the International Flower Show, New York City, by the American Rhododendron Society, New York and New Jersey Chapters. The plants for this exhibit, which will feature dwarf kinds, are being donated by members of the Society.

Elizabeth C. Hall, Sarah Gildersleeve Fife Research Librarian, arranged a display of literature relating to the subject of each of the four lectures in the 1962 Downtown Lecture Series and was available in the lobby of the French Institute Building, where the lectures were held, to answer general horticultural questions. Miss Hall made a tape-recording on garden books as Christmas gifts to be broadcast over Ruth Alampi's "Home Garden Hour" on WABC; gave an illustrated talk on "Gardens and Plants of New England, New York, Michigan, and Delaware" at Braker House of St. Barnabas Hospital in New York City; a lecture on "Garden Books," accompanied by a display of books, before the Millbrook Garden Club at the Cosmopolitan Club in New York City; and an illustrated talk on "Plants of the Bible" before the Women's Club of Bergenfield, New Jersey.

Howard W. Swift, Assistant Curator of Education, made a tape-recording for the Bob Dixon Show, C.B.S., about "Dish Gardens, Terrariums,

and Planters." This assignment resulted from a publicity release on the course under this title given in the Garden's Educational Program.

Dorothy Ebel Hansell, Editor of *The Garden Journal,* was elected Chairman of the Nominating Committee of the American Horticultural Society and will present the slate at the Seventeenth American Horticultural Congress to be held April 8-10, 1962, in Norfolk, Virginia. Mrs. Hansell was also elected Chairman of the Archives Committee of the Garden Writers' Association of America, and was recently appointed Chairman of the Committee on Publications of the American Association of Botanic Gardens and Arboretums by its President, Dr. Elizabeth McClintock.

Edward J. Alexander, Associate Curator, and Edward Maroney were inadvertently placed in the thirty-year group to receive anniversary gifts; they rightfully belong to the thirty-five year group of employees of The New York Botanical Garden.

Staff Appointment. Walter Singer, who had been employed for ten years as a foreman in the Conservatory of The New York Botanical Garden, and for the past two and a half years has been with Julius Roehrs Co., of Rutherford, New Jersey, returned to the Garden on March 1, 1962, as staff photographer. Mr. Singer's photographs have appeared in many publications and have received awards at exhibits.

Visitors to the Garden

Dr. Helmut Lieth, Botanisches Institut, Stuttgart-Hohenheim, Germany.

Dr. L. J. Nevling, Jr., Arnold Arboretum, Harvard University, Cambridge, Mass.

Dr. P. S. Green, Arnold Arboretum, Harvard University, Cambridge, Mass.

Dr. Richard A. Howard, Director, Arnold Arboretum, Harvard University, Cambridge, Mass.

Dr. Louis O. Williams, Chicago Natural History Museum, Chicago.

Dr. John H. Thomas, Dudley Herbarium, Stanford University, Stanford, Cal.

Dr. Lyman B. Smith, Smithsonian Institution, Washington, D. C.

Dr. Djalma Batista, Institutode Pesquiras de Amasonia, Manaus, Brazil.

Dr. Gabriel Edwin, U.S. National Arboretum Herbarium, Washington, D. C.

L. J. King, Philadelphia College of Pharmacy, Philadelphia.

Dr. J. J. Wurdack, U. S. National Museum, Washington, D. C.

Dr. Velva E. Rudd, U. S. National Museum, Washington, D. C.

Mrs. E. H. Norman, Bailey Hortorium, Cornell University, Ithaca, N. Y.

Dr. Warren H. Wagner, University of Michigan, Ann Arbor, Mich.

Norman Taylor, New York, N. Y.

Dr. L. G. Livingston, Botanist, Swarthmore College, Swarthmore, Pa.

Dr. William C. Denison, Mycologist, Swarthmore College, Swarthmore, Pa.

F. R. Jayne, Horticulturist, Swarthmore College, Swarthmore, Pa.

Stephen D. Koch, Swarthmore College, Swarthmore, Pa.

Peter H. Campbell, Swarthmore College, Swarthmore, Pa.

George C. Carroll, Swarthmore College, Swarthmore, Pa.

Laura Berkeley, Swarthmore College, Swarthmore, Pa.

Judith Hall, Arnold Arboretum, Jamaica Plain, Mass.

Claude Weber, Arnold Arboretum, Jamaica Plain, Mass.

Dr. Kent H. McKnight, Brigham Young University, Provo, Utah.

Dr. F. R. Fosberg, U. S. Geological Survey, Washington, D. C.

G. Dahl, University of Oslo, Norway.

Dr. George G. Fogg, Butler University, Indianapolis.

Gordon Scott, Director, Tennessee Botanic Garden, Nashville.

Dr. Harold Moore, Director, Bailey Hortorium, Cornell University, Ithaca, N. Y.

Dr. Charles E. Hess, Department of Horticulture, Purdue University, Lafayette, Ind.

Dr. Harmon Nelson and Dr. David Gregg, The Upjohn Company, Kalamazoo, Mich.

Dr. Max Milner, UNICEF, United Nations.

Dr. Seymour Hutner, Haskins Laboratories, New York, N. Y.

William T. Golden, Haskins Laboratories, New York, N. Y.

Dr. Ulrich Weiss, National Institutes of Health, Washington, D. C.

Dr. William B. Silverman, College of St. Thomas, St. Paul, Minn.

Otway Prevatt, Industrial Development Commission, Port-au-Spain, Trinidad.

Dr. Paul Waggoner, Connecticut Agricultural Experiment Station, New Haven, Conn.

Dr. L. Tukey, Pennsylvania State University, State Park, Pa.

Dr. W. H. Dickinson, West Virginia University, Morgantown, W. Va.

Dr. James K. McGuire, U. S. Weather Bureau, New York, N. Y.

Dr. Orman E. Street, Department of Agronomy, University of Maryland, College Park, Md.

Dr. A. V. Havens, Rutgers University, New Brunswick, N. J.

Dr. William McKee, U. S. Weather Bureau, New York, N. Y.

Dr. M. T. Vittum and Dr. Alvin Braun, New York State Agricultural Experiment Station, Geneva, N. Y.

Dr. Richard Hopp, University of Vermont, Burlington, Vt.

J. F. Felkenson, U. S. Department of Agriculture.

The following nematologists of northeastern agricultural experiment stations, visited the Garden in a group: Dr. H. W. Crittenden, University of Delaware, Dr. G. J. Stessel, University of Rhode Island, Dr. L. R. Krusberg, University of Maryland, Dr. R. A. Rohde, University of Massachusetts, Dr. Charles M. Heald and Dr. W. R. Jenkins, Rutgers University, Dr. C. E. Williamson and Dr. W. F. Mai, Cornell University, J. V. Bloom, Pennsylvania State University, and Dr. T. Chen and Dr. Avery Rich, University of New Hampshire.

Gifts to the Library. Mrs. Clifford Mallory has presented eighty-two horticultural and botanical titles from her library to The Library of The New York Botanical Garden. These include works of Michaux, Nuttall, and A. J. Downing; W. C. P. Barton's *Vegetable Materia Medica of the United States,* 1817; Capt. Basil Hall's *Extracts from a Journal written on the Coasts of Chile, Peru, and Mexico,* 1824; and many delightful nineteen and early twentieth century horticultural Americana, and several fine titles on historical gardens of the South.

These books are valued by the Library not only for their usefulness and intrinsic worth, but also because they are "association copies," reflecting the horticultural and botanical interests of Mrs. Mallory, long a member of the Advisory Council and an enthusiastic supporter of The New York Botanical Garden.

Spring Garden Tour to Greenwich, Conn., on May 16, 1962, sponsored by the Volunteer Associates of The New York Botanical Garden, will include houses as well as gardens. A box lunch will be served. Announcement of the houses and gardens to be visited and other details will be made shortly. Mrs. Oliver A. Vietor is the Chairman of the Spring Garden Tour.

An Exhibit of Sculpture by Edward Renouf of Washington, Conn., will be held in the Museum and Administration Building of The New York Botanical Garden during March 1962. Mr. Renouf's sculpture consists of parts of old farm-tools and machinery, assembled and composed into forms, then welded together. He uses mostly old New England iron. One of the pieces, "chow, the iron dog," to be exhibited at the Garden, was shown at the Whitney Museum last year.

The American Rock Garden Society held a midwinter meeting in the Snuff Mill of The New York Botanical Garden on February 3, 1962. At the morning session, Richard H. Pough gave an illustrated talk on "A Naturalist Visits Japan." Some of his superb colored slides had the quality of a beautiful Japanese painting.

In the afternoon, A. Clayton Scribner gave a very interesting illustrated talk on "The Flora of Newfoundland"; Henry and Mary Fleming, members of the Garden's staff, discussed "Dwarf Shrubs for the Rock Garden"; J. P. Zollinger spoke about "Living with One's Rock Garden"; and Kurt Baasch reminisced about "Saxifrages."

Harold Epstein, President of the American Rock Garden Society, and a member of the corporation of The New York Botanical Garden, introduced the speakers. Mrs. Hansell, one of the founders of the Society and an honorary life member, invited those who were not already members of The New York Botanical Garden to become better acquainted with the activities of this internationally known institution—by visiting it again or by wrting for literature about it.

The New York Mycological Society has been organized by John Cage, Esther Dam, Ralph Ferrara, Lois Long, and Guy C. Nearing "to reduce the gap between the amateur and the professional mycologist." The Society has only two officers: the Secretary, Miss Dam; the Treasurer, Mr. Ferrara. The annual dues are

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The winter meetings will be held at The New York Botanical Garden. The program for the next three months follows: March 17, "The Genus *Clitocybe* in Northeast and North America" by Howard E. Bigelow, Assistant Professor of Botany, University of Massachusetts; April 21, "The *Boletaceae*" by Esther A. Dick, Research Associate in Botany, Brown University; May 19, "The Morels and Their Relatives" by Dr. Stanley Smith, Associate Curator of Botany, New York State Museum and Science Services.

Library and laboratory study, including seminars, will be held each Saturday, 10 a.m. to 4 p.m., through May 19, 1962.

Mr. Nearing will lead the field trips scheduled on Sundays, 10 a.m. to 5 p.m., May 13 through November 25, 1962.

Torrey Botanical Club. The New York Botanical Garden is well represented in the official family of the Torrey Botanical Club. At the annual meeting on January 16, 1962, Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Botany, was elected Vice President; Dr. Herman F. Becker, Research Associate, Treasurer; Dr. Annette Hervey, Senior Research Associate, Corresponding Secretary; Howard Swift, Assistant Curator of Education, Manager of Publications; Dr. Clark T. Rogerson, Curator of Cryptogamic Botany, Bibliographer; Dr. Harold W. Rickett, Bibliographer and Senior Curator, Historian; and Joseph Monachino, Associate Curator of Herbarium, Chairman of the Field Committee. Dr. Lindsay S. Olive, Professor of Botany, Columbia University, was elected President; Dr. Marion A. Johnson, Department of Botany, Rutgers University, a member of the Garden's Board of Managers.

Dr. William C. Steere, Director, gave his address as retiring president; his subject, "Bryophytes in Experimental Research."

Dr. Pierre Dansereau, Assistant Director, Botany and Senior Curator, gave an illustrated lecture on "The Macronesian Islands" at the meeting at Fordham University on February 6; Dr. William Crotty of New York University discussed "Nucleo-Cytoplasmic Events in Fern Rhizoid Differentiation" at the meeting at Columbia University on February 20; and Dr. Bruce B. Stowe of Yale University, "Augmentation of Auxin and Gibberellin Action by Lipids" at the meeting at Columbia University on March 6, 1962.

On March 20, at Columbia University, Dr. A. E. De Maggio of Rutgers University School of Pharmacy will give "An Analysis of Alternation of Generations in Ferns;" at the meeting on April 3, to be held at The New York Botanical Garden, Dr. Sanford M. Siegal of Union Carbide Corporation will lecture on "Oxygen and Plant Growth from Anaerobiosis to Oxygen Poisoning"; and at the meeting to be held at Columbia University on May 15, Dr. K. K. Reddi of New York University School of Medicine will talk on "Tobacco Mosaic Virus."

The members of the Torrey Botanical Club have been invited to be guests of the Botany Department of Rutgers University at the dedication of the Nelson Biological Laboratories on April 28, 1962. The program includes a symposium on "Applying the Fundamentals of Biology to the Needs of Man" between the hours of 9:30 a.m. and 12 noon, and the dedication ceremony at 2 p.m., to be followed by "Open House" and demonstrations in the new laboratories.

Botanical Society of America. Nine distinguished botanists have been elected Corresponding Members of the Society, whose By-Laws provide that "Corresponding Members shall be chosen from authors of important contributions to the science of botany." The new members are:

Dr. Erwin Bünning who has made notable contributions in several areas of botany and plant physiology and has recently been prominent for his outstanding work in endogenus cycle in plants.

Dr. David Catcheside, an English geneticist, who is known for his work on *Oenothera, Drosophila,* and *Neurospora.*

Dr. Michael Evenari, Professor of Botany at Hebrew University, Jersusalem, who is well known for his studies of the effects of light and chemicals on seed germination and who has carried on important work on the ecology of desert plants.

Dr. Albert Frey-Wyssling, Professor of Botany at the Swiss National Technical College, Zurich, who is "one of the most versatile botanists of our time . . " "Through his several books he has exerted a very great influence on the development of modern botany, especially on the relations between microscopic structure and physiological function."

Dr. Roger Heim, who is Director of the Cryptogamic Section of the Museum of Natural History, Paris, "the most distinguished of French mycologists," and author of many mycological publications.

Dr. Eric Hultén, Professor and Director of the Department of Botany of the Riksmuseet, Stockholm, whose "botanical explorations are legendary," and whose publications are numerous. "His volumes on the Aleutian Islands and on Alaska are classics. His continuing work in Alaska is timely and brings him further into the sphere of interest of American botanists."

Dr. Hiroshi Tamiya, who is Professor at the University of Tokyo and Director of the Tokugawa Institute for Biological Research. He has devoted more than twenty-five years to the general physiology of photosynthesis in *Chlorella,* and recently has turned his attention to the life cycle of *Chlorella* and conditions controlling its cell-division. Dr. Tamiya has also done much basic work towards the development of mass cultures of algae for food.

Dr. Cornelius G. G. Van Steenis, who is Director of the Flora Malesiana Foundation in the Royal Herbarium, Leiden, Co-editor of *Reinwardtia,* a continuation of the *Bulletin du Jardin Botanique de Buitenzorg,* and Editor of *Flora Malesiana;* "a productive and highly regarded professional taxonomist."

Dr. Frans Verdoorn, who is internationally known for the publication of many important books through *Chronica Botanica,* for "his un-

tiring efforts in the fields of international cooperation and the history of botany." Dr. Verdoorn returned to The Netherlands in 1957, having carried on his editorial work and historical studies in Waltham, Massachusetts, since 1937. He organized the Bio-historical Institute of the University of Utrecht and is Professor of the History of Botany.

Dr. Emory Simmons, Mycologist, Quartermaster Research and Engineering Command, Natick, Massachusetts, spent two days in the Cryptogamic Herbarium studying members of the *Dematiaceae*.

Dr. James G. Horsfall, Director of the Connecticut Agricultural Experimental Station, left on February 1, 1962, for a four-month lecture and study tour of India and Japan. He will travel under the sponsorship of the Rockefeller Foundation, the United States Department of State, and a group of universities in India and Japan.

Besides conferring with officials on food problems Dr. Horsfall will lecture at seven universities in India on the control of plant diseases. His stay in that country is sponsored by the Indian International Center and arranged by Prof. T. S. Sadasivan of the University of Madras.

His lectures before twenty universities in Japan has been arranged by Dr. I. Uritani of Nagoya University.

A New Variety of Holly. 'Nellie R. Stevens', believed to be a cross between *Ilex cornuta* and *I. aquifolium*, was reported a new holly at the annual meeting of the Holly Society of America, held at Williamsburg, Virginai, last fall. The first-known tree of the new variety was observed at the home of Mrs. Eunice P. Highley, in Oxford, Talbor County, Maryland. Mr. and Mrs. G. A. Van Lennep Jr. took cuttings in 1952 to raise on their holly farm near St. Michaels. Two trees from these cuttings are now more than twelve feet tall.

The Van Lenneps are introducing this holly to the horticultural world under the name of 'Nellie R. Stevens', in honor of the original tree's owner, aunt of Mrs. Highley.

Dr. Shiu-Ying Hu of the Arnold Arboretum, Jamaica Plain, Massachusetts, and Dr. H. Harold Hume, Dean Emeritus of the College of Agriculture, University of Florida, have expressed the opinion that holly 'Nellie R. Stevens' came from a natural seedling as a result of cross pollination.

The Search for New Crops. The School of Agriculture, at North Carolina State College, Raleigh, is one of four such schools that co-operate with the U. S. Department of Agriculture in testing new crops for possibilities of 1) industrial-type oils with unusual characteristics, 2) fiber plants for new pulp sources, 3) seed gums for paper additives, 4) better industrial and seed proteins, and 5) minor constituents, such as drugs. The other three are in Montana, Nebraska, and Texas.

William T. Tike, Assistant Professor of Field Crops, states in *Research and Farming:* "When we get plants, they already have passed two tests. First, they will not add to present agricultural surpluses. Secondly, they have some characteristics that appear to be of industrial use . . If commercial production appears possible, they will be tested further by industry.

"Many of the crops we're working with come from other lands, where they may or may not be of value... Take the soybean. It was brought to the United States in the late 1880's. But it was not until the early 1930's that plant breeders adapted it for production in this country . . . It has taken years of research to develop the present uses for soybeans. Today, the soybean is one of the nation's largest feed and industrial crops. Nearly twenty-five million acres are cultivated annually.

"We aren't expecting another soybean, but our catalog of new crops shows some promising things. Bamboo's yield of cellulose for paper is said to be four times that of southern pine. It's also used for furniture, and its sprouts are considered by many to be a delicacy.

"Castorbean seeds contain about fifty percent oil that can be used in manufacturing cosmetics, fungicides, lubricants, paints, and plastics.

"The tough fiber from kenaf can replace important jute fibre in manufacturing burlap, twine, carpet yarn, and paper.

"Whole sesame seeds are used in a variety of breads, cakes, and candies. Oils derived are used as salad or cooking oil, in shortening, margarine, cosmetics, medicine, and insecticides. Meal, left from pressing, is used for cattle and poultry feed. Sunflower seeds contain about thirty five per cent oil, and this is used in cooking and salad oils, in margarine and shortening. Whole sunflower seeds are in demand as bird food. Oil from crambe seed is a rich source of a long-chain fatty acid that has a number of industrial uses.

"Sesbania, an upright, coarse-growing, annual legume, is grown for its fiber content as well as a green-manure crop.

"Other plants under test at North Carolina are cape marigold, pot marigold, Queen Anne's lace, rocket, meadowfoam, and Indian ironweed.

"Problems in getting these crops into production appear to be as varied as the crops themselves. Developing a shatter-resistant seed head may be a problem with one crop, a variety that will machine-harvest with another, a good stand with a third crop. It may take as much as ten years work to learn if we can grow one of these crops in North Carolina; or if not, if it will fit into the national economy."

BOOK REVIEWS (Continued from page 73)

1001 QUESTIONS ANSWERED ABOUT INSECTS. Klots, Alexander B., and Elsie B. Klots. 260 pages, illustrated, bibliography, indexed. Dodd, Mead and Co., New York. 1961. $6.00.

The question-and-answer method of presenting a subject is becoming more and more popular with author-teachers. Here is a splendid book for the layman-naturalist and the curious gardener. A few sample questions taken at random are: "What insects do damage to books and papers?"; "Do many insects benefit man as weed controllers?"; "What caterpillars give one a rash?"; "Can the Black Widow always be recognized by its famous hourglass?"; "Do insects ever cause asthma or hay fever?"

PRINCIPLES OF NEMATOLOGY. Thorne, Gerald. 553 pages, illustrated, bibliography, indexed. McGraw-Hill Book Co., New York, 1961. $15.00.

A definitive, authoritative textbook for the specialist, with technical descriptions and control methods. The introductory chapters, however, are well worth a careful perusal by the serious gardener who is seeking information on the history and vast economic importance of these agricultural and horticultural plant pests.

FLOWER ARRANGEMENT AND HOUSE PLANTS

ARTS AND CRAFTS FOR FLOWER ARRANGERS. Seibel, Kathryn H. 202 pages, illustrated (part colored), bibliography, indexed. D. Van Nostrand Co., Princeton, N. J. 1961. $5.95.

Mrs. Seibel firmly believes that improvised accessories should be an important part of creative flower arrangements. Her profusely illustrated book is teeming with ideas for containers, accessories, and backgrounds. Her choice of materials is varied—paper, wood, plastics, straw, glass, corn husks, metal, clay.

ENJOY YOUR FLOWERS. Compton, Joan. 72 pages, illustrated (colored front). Sportshelf, New Rochelle, N. Y., 1961. $4.50

From overseas comes this little book by a popular English lecturer on flower arrangement. She achieved newspaper acclaim, when she won the Gold Cup for Flower Arrangement at the 1958 Paris Floralies.

FESTIVE DECORATION THE YEAR ROUND. Waugh, Dorothy. 160 pages, illustrated, indexed. The Macmillan Co., New York. 1962. $3.95.

According to Miss Waugh, who is both author and illustrator of this very clever guide, almost every event calls for decorations, whether it be "Heart Affairs," "Patriotic Days," "Religious Celebrations," or "Public Occasions."

FLOWER EMBROIDERY. Kohler, E. Kay. 119 pages, illustrated. Charles T. Branford Co., Newton Center, Mass. 1961. $5.00.

Several hundred representative flower designs from twenty-three countries, with descriptive text by the former Art Director of Cheltenham Ladies' College. Fascinating traditional patterns for the woman who is clever with her needle.

FLOWER ARRANGING BY NUMBER. Boehm, Peggy, and Shizu Matsuda. 124 pages, illustrated. Sterling Publishing Co., New York. 1961. $2.50.

There is always something new in the world, even in flower-arrangement methods. In this little manual are numbered, step-by-step treatments, which point the way to success if directions are carefully followed.

GIFTS FROM THE GARDEN. James, Suzanne. 130 pages, illustrated, indexed. Hearthside Press, New York. 1961. $4.50.

Gifts from the garden is an unique idea for a book and one that has so many interesting and useful facets. Mrs. James offers, first of all, a garden calendar to help in seasonal giving; then special types of gifts, such as flower arrangements, corsages, planters, cuttings, gastronomic delights including herbs. The final

chapter is entitled "The Art of Attractive Presentation."

IKEBANA: THE JAPANESE ART OF FLOWER ARRANGEMENT; 2nd ed. Ohchi, Hiroshi. 124 pages, illustrated (part colored). Hastings House, New York. 1961. $5.95.

With the collaboration of the Ikenobo Institute of Flower Arrangement in Kyoto, Hiroshi Ohchi, a nationally known graphic artist and professor of drawing in Tokyo, presents this scholarly work on Ikebana. The first half of the book is devoted to a survey and analysis of the traditional and symbolic styles, with a chapter on color. In the second half, Mr. Ohchi discusses the modern Ikebana. The text is bilingual, German and English.

INDOOR GARDENING AS A PASTIME. Harvey, N. P. 162 pages, illustrated. Sportshelf, New Rochelle, N. Y. 1961. $4.25.

This British title may puzzle and confuse the American amateur gardener, when it comes to names of varieties, sources of supply, and English cultural practices.

NEW HORIZONS IN FLOWER ARRANGEMENT. Brooks, Myra J., Mary Alice and John P. Roche. 192 pages, illustrated (part colored), indexed. M. Barrows and Co., New York. 1961. $10.00.

The trio who produced this quarto are all "tops" with years of experience and with several successful books to their credit. Their present volume is a fine piece of work. The dedication in the front of the book well applies to its authors: "To all craftsmen who create not alone with the intellect but with the hand and the heart as well."

A SECOND TREASURY OF CHRISTMAS DECORATIONS. Hemingway, Beth. 126 pages, illustrated, indexed. Hearthside Press, New York. 1961. $3.95.

Mrs. Hemingway offers another well-illustrated collection of clever ideas for the Christmas holiday season. In addition to suggestions for arrangements, she devotes part of her book to the subjects of Christmas symbolism and customs, of storing holiday decorations, and of photographing.

FOR YOUNGER READERS

AROUND THE WORLD WITH DARWIN. Selsam, Millicent E. 47 pages, illustrated. Harper and Bros., New York. 1961. $2.95.

Millicent Selsam is greatly esteemed by children, parents, and teachers for the many superior nature-science books she has written during the past decade or more. She occasionally comes to the Library of The New York Botanical Garden in search of authentic source material. One of her most recent titles is this inspiring account of Darwin's journey into strange lands, which she has written for her younger readers.

BEYOND THE SHINING MOUNTAINS. [Boatfield, Jeffrey M.] Jeff Jeffries, pseud. 188 pages, illustrated. Roy Publishers, New York. 1961. $3.25.

Teen-agers who crave exciting stories of adventurous men and women should like this dramatic account of the building of a railroad across the continent, of Lewis and Clark, Fremont the Pathfinder, the Pony Express, and the Overland Stage.

CHRISTMAS TREES AND HOW THEY GROW. Blough, Glenn O. 48 pages, illustrated (part colored). McGraw-Hill Book Co., New York. 1961. $2.75.

An informative and well-illustrated book for the eight to ten-year-old group about the kinds of evergreen trees used in Christmas celebrations—how to tell them apart, how they grow from seeds, and how to decorate a Christmas tree for the birds.

COLBY'S NATURE ADVENTURES. Colby, C. B. 186 pages, illustrated, indexed. The Dial Press, New York. 1961. $3.50.

Mr. Colby particularly likes animals, and he has been writing about them for years in newspapers and magazines. Now he has assembled some of his stories into this book. His observations are often amusing such as: "It's a wonder moose have any time for anything but eating, for they require between forty and sixty pounds of food daily, and that amount in twigs, grass, and lily-pad roots demands quite a bit of hunting."

BELOVED BOTANIST: The Story of Carl Linnaeus. Stoutenburg, Adrien, and L. N. Baker. 192 pages. Charles Scribner's Sons, New York. 1961. $2.95.

Carl Linnaeus was born in a turf-roofed cottage in Stenbrohult, Sweden, on a May night in 1707. He loved plants from the time he was a young boy, but he did not know that he was to become the world's most beloved botanist.

His father was a pastor and hoped that his son would follow in his footsteps. Linnaeus managed to struggle through school and graduated third lowest in his class, but all this time he knew that he could never fulfill his father's wish. Instead, he yearned to know more of the medical field. He got his chance when a friend of his father offered help.

Linnaeus worked hard and managed to get into Uppsala College. He was helped tremendously by friends who were influential in the botanical and medical field. They offered their homes for him to live in, they offered their books, and they even provided jobs so that he could raise money to get through college.

Carl Linnaeus made many journeys during his years at Uppsala. The first one was to Lappland. He kept a diary of this trip, and it is still read and loved today.

Later Carl worked for his doctor's degree so that he could begin his practice; but before he started, he met the girl he was to marry. However, he promised to get his degree before he married so that he would have a job that could support him and his family. He traveled to Holland as a chaperone for one of his friend's sons; he got his doctor's degree while in Holland and started working. He worked for three years in Amsterdam before he married.

When Linnaeus married, he set up a private practice; but he was not happy with his job as a doctor. He desired to teach botany. The chance came one day, and he immediately grasped it. However, before he started teaching, he made a trip to Gotland, an island in the Baltic Sea. Linnaeus tried his hardest to make scientific excursions to uncivilized parts of the island but without success because of bad roads. When he returned from his trip, he started his career as a teacher at Uppsala College.

Linnaeus enjoyed his work as a teacher and found more time to do the things he desired. He joined botanical and various other types of organizations. He worked for the government. He built himself a castle (really a cottage) and named it Hammarby; it still stands today. He wrote more and enjoyed life more, raising a family and working at what he always wanted.

Carl Linnaeus lived a full and successful life. He contributed many books on plant classification, and his work, *Species Plantorum*, published in 1753, is the starting point for the names of flowering plants. He achieved in his lifetime more than most persons ever do. "Much was accomplished because of his extraordinary ability to see things as they are. Besides his methodical genius he had the ability to express himself in his writing in a way that was simple, direct, and superbly clear." He died on January 10, 1776.

MARILYN ROGERS

Marilyn is the fourteen-year-old daughter of Dr. David J. Rogers, Curator of Economic Botany. She gleaned the above information from the pages of *Beloved Botanist*.

REVIEW OF RECENT BOTANICAL BOOKS

COFFEE. Botany, Cultivation, and Utilization. Wellman, Frederick L. xviii + 488 pages, illustrated, indexed, bibliography. Interscience Publishers Inc., New York. 1961. $13.00.

The work is a review of the knowledge of an important tropical beverage crop by an acknowledged authority in the field. A history and botany of the species *Coffea arabica* and other economically important species of the genus are given. There is a summary of the physiological knowledge of the plants, of the genetics, of the agronomic problems, and of the economy and commerce. In general, the twenty-one chapters give an excellent picture of the various disciplines involved in scientific studies of coffee. There is a good bibliography and subject and author index. There are few typographical errors, and Dr. Wellman writes in a pleasing, informal style. The quality of the illustrations is outstanding, and the illustrations seem pertinent to the text.

An interesting facet of the book is the summary of the "noble" coffee. Most of the plantings of the New World and many other important coffee-growing areas are traced to one tree raised in the greenhouse of the French king, Louis XIV.

Dr. Wellman is an outstanding coffee pathologist, and the portions in the book on the problems of diseases and insects are particularly good.

DAVID J. ROGERS

THE PLANT COMMUNITY. Hanson, Herbert C., and Ethan D. Churchill. 218 pages, illustrated, indexed. Reinhold Publishing Corporation, New York. 1961. $4.95.

A plant growing in its habitat is not an isolated entity in a static setting, but a member of a community intricately related to the present and past environment. It is a living, vibrantly dynamic, evolving member of an ever-changing community influenced by and depending for its very life on a complex mosaic of factors, climate, soil, and biotic associations. Temperature, weather, light, moisture, macroclimate, microclimate; topography, the nature of the substratum, be it rock, bark or water; the physical and chemical composition of the soil at different horizons, inorganic and organic, trace elements; the plant associates both of its own variety and other species of diverse life-forms, competing beneath the earth and in the air for space, food, light, parasitic, commensal, mycorrhizal (a plant's "excretions and products of decomposition by preventing the growth of some species and favoring that of others, may influence the formation and maintenance of certain plant groupings" *The Plant Community*, p. 37); the native and introduced fauna, ruminants, annelids, slugs, birds, insects, man; geological changes; fire—all these and numerous other interacting factors play an intrinsic part in either promoting development of, retarding, or utterly eliminating an individual plant, its ecotype or species or even a whole population.

Obviously it is not possible to understand everything about a plant growing in its habitat, since that would require not only complete understanding of the structure, physiology, and genetics of the plant itself ("every individual of each species probably differs slightly in its requirement and range of ecological amplitude") but also a thorough knowledge of the total environment and ecology. The community, too, cannot be rigidly circumscribed, since it is heterogeneous, seasonal, cyclic, always fluctuating or evolving, and is never for a moment exactly the same; the different spots or areas have never precisely the identical plant composition, microrelief, soil, exposure, and other environmental conditions; furthermore it is sometimes linked to other communities by a gradual transition forming a continuum, both in the varying fidelity (exclusiveness) of its species and in environmental factors, so that definite demarcations either within or without the community are not always possible. Yet in spite of all these complexities, the science of ecology has grown; much can be learned in a systematic way, a semblance of wonderful order or pattern discerned, vegetational unites discriminated as discrete as the Arctic tundra is from the tropical rain-forest, and it is possible to build classifications of at least relative application, all tremendously useful.

The Plant Community touches lucidly, succinctly, and charmingly on these and many other interesting factors and problems. It is stocked with illustrations, examples, and facts, supported by an extensive bibliography. The technical terms of ecology are printed in bold face for emphasis. The authors start with a discussion of the ecological characteristics of species and populations and build up to a qualitative and quantitative analysis of the community and its dynamics and classification.

JOSEPH MONACHINO

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THE EUCALYPTS. Botany, Chemistry, Cultivation and Utilization. Penfold, A. R., and J. L. Willis. xx + 551 pages, illustrated, bibliography, conversion factors, indexed. Interscience Publishers, New York. 1961. $13.25.

This is one of the very useful books published by Leonard Hill in "The World Crops Series." While it is unusual to find forestry in a crops series, it is still a valuable addition to the study of tropical and subtropical agriculture.

The Australians have been the major movers in the study of *Eucalyptus* and have contributed the most concise and precise knowledge concerning the genus. One feels that the Australians have a national pride in the eucalypts and have spent much time in the consideration of the various aspects of their study. The classification has been done by a number of men in Australia, and perhaps the most comprehensive monograph is that of Maiden (1903-33). Blakely in 1934 and 1955 described 500 species and 138 varieties and wrote extensive keys to the genus. The punched card index compiled by Hall and Johnston (1953), duplicates of which may be purchased, is a unique and valuable contribution to the taxonomy.

Many of the species of *Eucalyptus* have been transplanted to other parts of the world and contribute to the forestry of most tropical and subtropical countries. Very extensive plantings have been made in Brazil, where the wood has been found useful in many different ways. Different species are uesd for a variety of purposes, not only tropical forest utilization, but also as windbreaks, shade trees, ornamentals, and providers of essential oils.

The descriptive nomenclature of the various parts of the plant has been developed in a rather unique way, and it takes a little reading to determine what "ground wood" and other terms mean. Considerable attention is given to the morphology of the plant, its growth, its genetic studies, insects and other pests as well as utilization. Essential oils from the various species contribute tremendously to economic utilization of the crop. About one third of the book is given over to a description of the sections of the genus and the most outstanding species of each of the sections.

There are a number of useful plates, and the literature cited is quite comprehensive. The authors' style is not as easy as others in "The World Crops Series," but it is workable. I recommend the book to laymen and to professionals interested in a very fascinating group of plants.

DAVID J. ROGERS

APICAL MERISTEMS. Clowes, F.A.L. 217 pages, illustrated, indexed. Blackwell Scientific Publications. Oxford. 1961. $7.50.

With only special exceptions, plants grow in in length from their tips. These zones of growth at stem and root tips are called apical meristems, and the rate of growth, as well as the form

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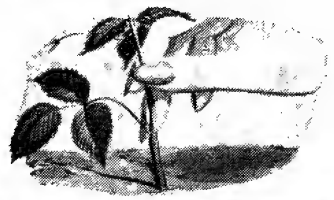

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which the plant has, is determined very precisely by the division and elongation patterns of the cells in these meristems. A great deal of research has been conducted on apical meristems, and our knowledge of the capabilities and potentialities of plant cells has been correspondingly advanced. Dr. Clowes is one of the world's foremost authorities in this branch of plant structure, and this monograph is an important contribution to the field.

The book attempts, most successfully, to codify and integrate the many research efforts into a unified statement on the current status of our understanding of apical meristems. Morphological, experimental, and biochemical data are correlated, discussed, and evaluated with a clear appreciation of the importance of each piece of information. Various theories of morphogenesis are introduced where appropriate and are examined critically. RICHARD M. KLEIN

TOBACCO, EXPERIMENTAL AND CLINICAL STUDIES. Larson, P. S., H. B. Haag, and H. Silvette. 932 pages, indexed. The Williams & Wilkins Co., Baltimore, Md. 1961. $20.00.

The subtitle is "A Comprehensive Account of the World Literature." The authors are professors of pharmacology at the University of Virginia. The book is a monumental sifting of the world literature of the effects of tobacco on humans largely, but also on other animals. This is not at all a botanical work and deals only with the effects of the finished product, either smoked, chewed, or sniffed. The authors address their work to research workers and specialists, and to physicians. The greatest part of the work deals with the tobacco product nicotine, as might be expected. DAVID J. ROGERS

TRACE ELEMENTS IN PLANTS. Stiles, Walter. xiv + 249 pages, illustrated, indexed. Cambridge University Press, New York. 1961. $7.50.

Professor Walter Stiles is a most distinguished botanist and plant physiologist whose earlier editions of Trace Elements have been used almost universally by students and researchers. This enlarged and somewhat modified edition has been ten years in the making and is worth the time. Primarily a long review of the role of trace elements in plant metabolism, it suffers from the unavoidable problem of being one to several years behind the frontier of current research, but its utility will not suffer from this defect. One can think of *Trace Elements in Plants* as the primary source of the basic literature in the field to which the newer information can be added without excessive library labor. RICHARD M. KLEIN

LETTERS TO THE EDITOR

I was interested in the article on the Boerner Botanical Garden which is, of course, one of my "pets." This was named after my brother who actually dreamed—and designed a great part of the Milwaukee Park System. The men in the Park Department are carrying Al's plans forward and continuing his philosophy. The Milwaukee Park System will be a terrific thing in the long run. John Voight certainly did a nice job on the article.

E. S. BOERNER
Secretary-Director of Research
Jackson and Perkins Co.
Newark, N. Y.

We have two small patches or tiny gardens of wild flowers in shady corners of our wooded yard. But we are always looking for replacements or for ways to increase the variety and number of wild flowers in our adjoining wood lot. So we were particularly interested in the article by Martha Compton in your November-December issue, and wish you would have two copies sent us. . We think it will be of help in our efforts to make more wild flowers feel "at home" with us. Congratulations to your photographer and engraver.

Donald Culcross Peattie says that the glen below Pearson's Falls, six miles west of Tryon, offers a greater variety of trees, shrubs, flowers, mosses, and lichens than any other similar area in America. We believe you would enjoy a visit here, and should you ever get down our way, do let us know.

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THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

Vol. 12 No. 3 May-June 1962

THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

DOROTHY EBEL HANSELL
Editor

This issue is dedicated to the members of the Herb Society of America, which will hold its annual meeting in Washington, D. C., May 13-16, 1962, and especially to the members of the New York Unit who redesigned and replanted the Herb Garden at The New York Botanical Garden in 1960, at the same time establishing an adjacent garden for the study of herb collections, and who maintain an active interest in these gardens.

CALENDAR

May 16, 1962. Spring Garden Tour to Greenwich, Conn., sponsored by the Volunteer Associates of The New York Botanical Garden.

May 17, 1962. Ninth Annual House and Garden Tour, benefiting the Institute of Physical Medicine and Rehabilitation of New York University Medical Center, in Westchester County, N. Y., and Connecticut.

May 22, 1962. Annual Meeting of The New York Botanical Garden.

May 25, 1962. Garden Writers' Day at The New York Botanical Garden.

May 30, 31, June 1, 1962. Annual Meeting of the American Association of Botanic Gardens and Arboretums, Wooster, Ohio.

June 6, 1962. Twentieth Annual Rose Day at The New York Botanical Garden.

August 31-September 8, 1962. Sixteenth International Horticultural Congress, Brussels, Belgium.

March 19-20, 1963. International Flower Show, City Hall, Cape Town, celebrating the "Golden Jubilee" of the National Botanic Gardens of South Africa, Kirstenbosch.

April 26-October 13, 1963. International Horticultural Exposition, Hamburg, West Germany.

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CREDIT FOR ILLUSTRATIONS

We are indebted to the Display Committee, Mrs. Charles Burlingham, Chairman, for the selection of the front cover illustration—a scene in the Thompson Memorial Rock Garden of The New York Botanical Garden, photo by Gottscho-Schleisner; p. 81 **Passiflora incarnata,** p. 82 upper right, **Epigaea repens,** lower left, **Viola odorata,** lower right, **Convallaria majalis,** drawn by George Macmillan Jr.; p. 86, **Claytonia virginica,** Comstock; p. 89, **Hepatica nobilis** drawn by Charles C. Clare Jr.; p. 90, U.S.D.A. photographs; p. 91, Nannette M. Strayer; pp. 93, 94, Sanwa Bank, Ltd.; p. 95, Information Office, Consulate General of Japan, N.Y.; pp. 96, 99, 100 upper, p. 101, T. H. Everett; p. 97, Gottscho-Schleisner; p. 98, p. 100 lower, W. B. Wilder—courtesy Helen M. Fox; p. 102, Heuzey: **La Masse d'armes.** Paris, 1887: p. 105, Herman F. Becker; p. 106 K. N. Kaul; pp. 108, 109, 110, 111, 112, 113, Pierre Dansereau; p. 118 Walter Singer.

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THE MEANING OF THE MAYFLOWER

By JOHN ASCH

Since his youth Mr. Asch has traveled extensively in the United States, Europe, the Middle East, and Africa, studying and working with plant life. He was graduated from the National Farm College, Doylestown, Pennsylvania, and attended the University of Montpellier, France, and the University of California at Riverside. He did plant exploration for the Hebrew University, Jerusalem, where he also participated in research at the Dead Sea. For ten years he was owner-manager of his own fruit, herb, vegetable, and flower farm near Nice, France. Mr. Asch is always seeking to define the great benefits that mankind has derived from the plant kingdom. He is presently writing a book on the uses, history, mythology, and folklore of plants. He has contributed articles to *The New York Times, American Home, Popular Gardening, The Journal* and *The Garden Journal* of The New York Botanical Garden, and *Natural History Magazine.*

"WHEN THE FLOWERS APPEAR IN THE FIELDS, and the time of the singing of the birds is come, let there be a great day set aside to celebrate sports and floral play in honor of Flora, the goddess of Flowers and Spring."

So in ancient Rome. So for many centuries and in many lands May Day has been observed. The Anglo-Saxons called this month *thrimilce,* because then the pastures were so lush that cows could be milked three times a day; the present name is from the Latin Maius, perhaps from Maia, the goddess of growth and increase. Most of the celebrations have centered around the Maypole. Even today on the first of May we may see the Maypole in our parks or on some school campus, gaily decorated with bright streamers of ribbon and surrounded by groups of dancing youth.

A poetic custom of May Day is the "offering of May" to a beloved one. This colorful rite is still observed by many peasants in Europe. In the quiet darkness of the night the lover carefully digs out a young spruce or fir tree and bears it to his sweetheart's home, as the sun starts to rise on the dawn of the first day of May. Quietly he plants the tree, bedecked in a pure white silken ribbon, under her window. When finished with this task, he starts to sing softly his words of love, and his melody enters her room to awaken her. She rises and looks out of the window, while he sings the second verse. The third verse is sung by her happy voice in acknowledgement of her love. Thus they become betrothed. In later years they will contentedly rest under the shade of this tree while playing with their grandchildren.

This is but one example of the world-wide happy observance of the day that was set aside in olden times to celebrate the passing of the cold winter storms in northern Europe, the warming and stirring of Mother Earth, and the emerging of the flowers which eventually will be transformed into the fruits of the harvest.

The worship of the goddess Flora under various names can be traced back to very ancient times. She was the object of religious ceremonies among the Chaldeans, the Phoenicians, the Goths, and other early peoples before the establishment of Rome. As early as 1350 B. C., the Canaanites worshipped Baal, the goddess of fruitful and nourishing earth, by erecting a stake or tree bedecked with drapery and bandelets which they called the Asherah. The sacred tree of the Mesopotamian monuments also exhibits this feature. Flora was originally Sabine, the goddess of the spring and of flowers and blossoms in general, to whom prayers were offered for the prospering of ripe fruits of the field, orchard, and forest. This worship was introduced to Rome by the Sabines in 238 B. C. The festival, called the Floralia, commenced on April 28 and continued through May 3.

For centuries all ranks of people in many lands went "a-Maying" to gather flowers and green sprigs for their wreaths and to bring the Maypole to the village square. The Romans introduced this celebration to England, where during the Middle Ages this was the most joyous festival of the year. In Italy, France, Germany, Scandinavia, and the Slavic countries the festival of flowers, or of spring, usually begins towards the end of April and terminates on the Feast of St. John, April 21.

Since May-day celebrations were performed in many lands for over three thousand years, and each region chose suitable local plants that blossomed on the first day of May or were satisfactory for use as sprigs and Maypoles, no single plant is universally known as the Mayflower. More

than one hundred different kinds of plants are designated by that name.

One of the earliest spring blossoms that the Pilgrims saw after their first terrible winter was the trailing arbutus, *Epigaea repens,* and so they called it the Mayflower. This plant has since become the state flower of the Commonwealth of Massachusetts and is one of the leading candidates for the honor of the national flower of the United States. As early as 1628 Pilgrim youths celebrated May Day by dancing around a Maypole, an act which scandalized Governor Bradford. Although May-day celebrations were looked upon with keen disfavor by the Puritan fathers, the custom of observing the day with merrymaking and gladness has persisted in the United States.

The May-apple, *Podophyllum peltatum,* which is erroneously called the mandrake, is another native plant that has been connected with May-day celebrations in the eastern part of our country. In many eastern and central states the liverleaf, *Hepatica nobilis,* is so employed. Other American plants called Mayflower in different sections of the country are *Passiflora incarnata, Claytonia virginica, Penstemon,* and *Stellaria holostea.* The Canadian Mayflower is the wild-lily-of-the-valley, *Maianthemum canadense.* The Mayflower of some Latin American countries is *Cattleya skinneri;* it is also the national flower of several Latin American countries. *Spiraea corymbosa,* native to the eastern United States, is beloved in New South Wales, Australia, and has been called May in that part of the world for over one hundred years. It was introduced to Sydney in the early seventeenth century, soon escaped cultivation, and grows abundantly in southeastern Australia.

In England, May Day has been celebrated since the time of the Druids who held a somewhat similar festival—the Feast of Beltine or Cetshamain. This was the great Celtic spring festival. Many different kinds of flowers are used on May Day by the country and townsfolk in England. One of the most common British Mayflowers is May, the English hawthorn, *Crataegus monogyna.* The comprehensive

list that accompanies this article includes other May-flowering plants used by the British in May-day customs.

One of the colorful British customs, descended from the days when there were great fireplaces and huge chimneys, is the decking of a chimney sweep in greenery and calling him "Jack of the Green." In certain Slavic countries St. George's Day, which falls on April 23, is celebrated by young people who dance bedecked with flowers and garlands. They select a "Green George," either a lad who is dressed up as a tree, or a Maypole which is decorated with garlands of flowers, streamers, and other gay objects. The choosing of a particular person to symbolize May Day originated in ancient Rome during the Floralia festivals, when the youth of the land competed in races to see who would reach the statue of the flower goddess first and place a wreath on her head.

In a few places a living tree which has been planted in the village square serves as the community Maypole in springtime and as the community Christmas tree in winter.

PLANTS ASSOCIATED WITH MAY-DAY CUSTOMS

Mr. Asch, in compiling this list, used the botanical names as they appeared in literature and other source material. Certain of these botanical names have been superseded by later names; those in quotation marks and with parentheses are the old names. Many common names are translated into English, not given in the language of the country concerned.

May-day Name	Scientific Name	Common Names	Locality Where Used
May	*Acer pseudo-platanus*	sycamore	England, Europe
	Arabis alpina	mountain rock-cress, lady's cushion	England, Europe
	**Crataegus monogyna ("C. oxyacantha")*	May, English hawthorn	England, Europe, North America
	Spiraea corymbosa	garland flower	New South Wales, Australia
	Syringa vulgaris	common lilac	England, Europe
	Ulmus procera ("U. campestris")	English elm	southern England
	Viburnum tinus	laurustinus	England, Europe
May-apple	*Achlys triphylla*	deer-foot, vanilla leaf	California, Washington, Oregon, England
	Crataegus aestivalis	apple haw	Gulf coast, southern United States
	**Crataegus monogyna ("C. oxyacantha")*	apple haw	England
	Exobasidium sp.	leaf gall	New Jersey
	Passiflora incarnata	wild passion-flower	southeastern United States
	Podophyllum peltatum	May-apple, American or false mandrake	eastern United States
May ball	*Viburnum opulus sterile*	cranberry-bush, snowball, guelder-rose	England
Mayberry	*Rubus palmatus*	bank raspberry	England
May billy	*Agaricus tricholoma*	St. George's agaric	England
	Boletus luteus	Polish mushroom	Poland, England
	Exobasidium vexans	blister blight	England
May blob	*Caltha palustris*	marsh-marigold, king-cup, cowslip	England
or	*Cardamine pratensis*	bitter-cress, cuckoo flower, lady's smock	England
May blub	*Primula veris*	cowslip	England
	Trollius europaeus	globe-flower	England
May bloom	**Crataegus monogyna ("C. oxyacantha")*	English hawthorn	England
or	*Convallaria majalis*	lily-of-the-valley	France, United States
May blossom			
May buds	*Ranunculus acris*	buttercup, blisterflower	England
	Ranunculus repens	creeping crowfoot, sitfast	England
May bush	*Amelanchier canadensis*	shadbush, sarvice-berry	South Carolina, Europe
	**Crataegus monogyna ("C. oxyacantha")*	May, English hawthorn	England, Europe
May cabbage	*Botrychium lunaria*	grape-fern, moonwort	England, Europe
May cherry	*Amelanchier ovalis*	sarvice-berry, shadbush	England, Europe
	Prunus cerasus	sour cherry	Eurasia
	Prunus padus	bird cherry	Europe
May duke	*Prunus cerasus*	sour cherry	Europe, England
	Prunus spinosa	sloe, blackthorn	England, Europe
Mayflower	*Anemone caroliniana*	Carolina anemone	southern United States
	Anemone patens	pasqueflower, easter-flower	Europe, central and western United States
	Anemone quinquefolia	American wood anemone	North America
	Anemonella thalictroides ("Syndesmon thalictroides," "Thalictrum anemonoides")	rue-anemone, starflower	eastern North America
	Anthemis arvensis	field camomile	Europe
	Anthriscus sylvestris	chervil, cow-parsley	Europe
	Arabis albida	wall rock-cress	Eurasia, Europe
	Arabis stricta	rock-cress	England, Europe
	Bellis perennis	English daisy, bachelor's-buttons	Bohemia
	Calla palustris	water-arum	England
	Calophyllum longifolium	Calaba tree	southern Eurasia
	Caltha palustris	marsh-marigold, cowslip	England
	Camellia japonica	Japanese camellia	Japan
	Cardamine pratensis	lady's smock, cuckoo flower	England
	Cattleya skinneri	San Sebastian orchid	Latin American countries
	Cheiranthus cheiri	wallflower	England, Europe
	Chelidonium majus	celandine	Europe
	Chrysanthemum balsamita ("C. majus")	costmary	England
	Chrysanthemum leucanthemum	ox-eye daisy	England, Europe
	Chrysanthemum parthenium	feverfew	England, Europe
	Claytonia virginica	spring beauty	eastern United States
	Convallaria keiskii	Japanese lily-of the-valley	Japan
	Convallaria majalis	lily-of-the-valley	France, Italy, England, United States
	Crataegus aestivalis	may haw, apple haw, American hawthorn	southern United States
	**Crataegus monogyna ("C. oxyacantha")*	English hawthorn	England, Europe
	Dianthus plumarius	gilliflower, cottage pink	Europe, England
	Echinops sphaerocephalus	globe thistle	Europe, Eurasia
	Epigaea repens	trailing arbutus	New England, Nova Scotia
	Filipendula ulmaria ("Spiraea ulmaria")	bittersweet, queen-of-the-meadow	England, Europe

May-day Name	Scientific Name	Common Names	Locality Where Used
Mayflower (contd)	*Galium verum*	bedstraw, curdwort, our lady's bedstraw	Europe, Italy
	Hepatica nobilis ("Anemone acutiloba")	spring beauty	Eurasia
	Hepatica nobilis ("Anemone hepatica")	liverleaf, liverwort	Germany, Europe
	Hepatica nobilis ("H. americana")	liverleaf, liverwort	eastern and central United States
	Iris laevigata	Japanese iris	Japan
	Laelia grandis	May orchid	Latin America
	Lathraea squamaria	Mayroot, toothwort	England, Europe
	Loiseleuria procumbens	alpine-azalea	Switzerland, Scandinavia
	Lonicera caprifolium	honeysuckle	England
	Lunaria rediviva	perennial honesty, moonwort	Eurasia
	Lychnis dioica	red or morning campion	England, Europe
	Maianthemum bifolium	beardtongue	England, Europe
	Maianthemum canadense	Canada mayflower, false lily-of-the-valley, bead-ruby	Canada
	Matricaria chamomilla	German chamomile, sweet false chamomile,	Europe, Germany
	Matricaria inodora	corn mayweed, bridal-rose, scentless false chamomile	Europe
	Narcissus pseudonarcissus	daffodil	Europe
	Orchis mascula	May orchid, purple orchis, blue butcher	England
	Orobanche spp.	broomrape, Mayroot	England, Europe
	Osmunda regalis	royal fern, flowering fern	North America
	Paeonia suffruticosa	tree peony	Japan
	Papaver somniferum	opium poppy	Europe
	Penstemon spp.	beardtongue	Plains States, Rocky Mountain States
	Phlox spp.	phlox	Europe, England
	Phlox caespitosa	white phlox	Wyoming
	Polygala paucifolia	Indian pink, fringed milkwort, flowering wintergreen	northcentral United States, Canada
	Primula elatior	oxlip	England, Europe
	Primula glaucescens	primrose	England
	Primula veris	cowslip	England, Europe
	Primula vulgaris	primrose, May spink	England
	Prunus padus	bird cherry	Eurasia, Europe, England
	Ranunculus bulbosus	kingscup	England, Germany
	Ranunculus ficaria	pilewort, lesser celandine	England
	Rhododendron hirsutum	hairy rhododendron	Germany
	Rhododendron keiskei	Japanese rhododendron	Japan
	Rhododendron japonicum ("Azalea japonica")	Japanese azalea	Japan
	Rhododendron nudiflorum	pink azalea, mountain pink	Prairie and Plains States
	Rosa cinnamomea	cinnamon rose	Italy
	Rosa eglanteria	Eglantine, sweetbrier	England
	Rosa foetida	Austrian brier	England
	Salix gracilistyla	willow	Japan
	Salix viminalis	common osier, pussywillow, May-gosling	England, Europe, Scandinavia
	Saxifraga virginiensis	saxifrage	Virginia
	Solanum melongena	sodom-apple, dwarf eggplant	Eurasia, Europe
	Sonchus oleraceus	sow-thistle, coleswort	England
	Spathelia simplex	mountain-pride, Maypole	England, Europe
	Spiraea prunifolia	bridal-wreath	eastern United States
	Stellaria holostea	stitchwort, Easter-bells	Europe
	Syringa vulgaris	common lilac	Europe, England, United States
	Taraxacum officinale	dandelion	Germany, Europe
	Trientalis borealis ("T. americana")	May-star, wintergreen, starflower	eastern North America
	Trollius europaeus	globe-flower	England
	Tulipa gesneriana	common tulip	The Netherlands
	Ulex europaeus	golden gorse, furze	Europe, England
	Valeriana officinalis	common valerian, garden-heliotrope	Europe
	Veronica hederaefolia	speedwell	England
	Veronica latifolia	speedwell	Austria, Germany
	Viburnum opulus sterile	snowball, guelder-rose	Europe
	Viburnum tinus	laurustinus	Europe, England
	Viola odorata plena	double sweet violet	Italy, Europe
	Wisteria floribunda	wisteria	Japan
May gosling	*Salix viminalis*	common osier, pussywillow	England, Europe, Scandinavia
May gowan	*Bellis perennis*	English daisy	England, Europe
May grass	*Secale cereale*	winter rye	Scotland, Ireland
	Stellaria holostea	stitchwort, Easter-bells	England, Europe
May haw	**Crataegus monogyna ("C. oxyacantha")*	English hawthorn	England
May-lily	*Convallaria majalis*	lily-of-the-valley	France, Europe, United States
May-of-the-meadows	*Filipendula ulmaria ("Spiraea ulmaria")*	bittersweet, queen-of-the-meadow	Europe, England
May orchid	*Orchis mascula*	May orchid, purple orchis, blue butcher	England
May pear	*Amelanchier canadensis*	sarvice-berry, shadbush	Canada

May-day Name	Scientific Name	Common Names	Locality Where Used
Maypole	*Spathelia simplex*	mountain-pride	England, Europe
Mayroot	*Lathraea squamaria*	toothwort	England, Europe
	Orobanche spp.	broomrape	England, Europe
May rose	*Rosa cinnamomea*	cinnamon rose	Italy
	Rosa eglanteria	eglantine, sweetbrier	England
	Rosa foetida	Austrian brier	England
	Rosa spp.	rose	Japan
	Viburnum opulus sterile	guelder-rose	Germany
May-spink	*Primula vulgaris*	primrose	England
May-star	*Trientalis borealis ("T. americana")*	wintergreen, starflower	Labrador
May then	*Anthemis nobilis*	chamomile	Saxony
May tosty or tosti	*Viburnum opulus sterile*	guelder-rose	England
Maytree	*Abies alba*	silver fir	Scandinavia, Germany, France, Eurasia
	Acer campestre	hedge maple	Eurasia
	Betula alba	white birch	Europe
	Betula verrucosa	silver birch	Scandinavia, Eurasia, Saxony, Germany, Slavic countries
	Carpinus betulus	European hornbeam	England, Europe
	Crataegus aestivalis	American hawthorn, May haw	United States
	**Crataegus monogyna ("C. oxyacantha")*	May, English hawthorn	England, Europe
	Fagus sylvatica	European beech	Germany, Europe
	Fraxinus excelsior	European ash	Scandinavia
	Laurus nobilis	sweet bay, laurel	Italy, Europe
	Olea europaea	olive	Japan
	Paulownia tomentosa	empress tree	Japan
	Picea abies	Norway spruce	Scandinavia, France
	Pinus nigra	Austrian pine	Austria, Switzerland, Eurasia, Europe
	Platanus orientalis	Oriental sycamore	England, Europe
	Populus tremula	aspen, European poplar	Bavaria
	Quercus robur	English oak	England, Europe
	Salix alba	osier, white willow	Ireland, Romania
	Sambucus nigra	European elder	Savoy
	Sorbus aucuparia	rowan, mountain-ash	Scandinavia, Ireland, northern England, Wales, and Germany
	Ulmus procera ("U. campestris")	English elm	England
Mayweed	*Anthemis cotula*	dog-fennel	Eastern and Plains States, England
	Anthriscus sylvestris	cow-parsley, chervil	Europe
	Chrysanthemum balsamita	costmary	England
	Chrysanthemum leucanthemum	ox-eye daisy	England
	Chrysanthemum parthenium	feverfew	America, England
	Cotula coronopifolia	brass-buttons	southern Europe
	Dyssodia papposa	fetid-marigold	western United States
	Fucus serratus	sea-wrack	Wales, Ireland
	Matricaria chamomilla	sweet false chamomile	Germany
	Matricaria inodora	scentless false chamomile	Italy, Greece
Maywings	*Polygala paucifolia*	fringed milkwort, flowering wintergreen	North America
Maywort	*Artemisia vulgaris*	mugwort	Eurasia, England
	Galium cruciata	crosswort, mugwort, lady's bedstraw	England

***Crataegus oxyacantha**, now **C. oxyacanthoides**, is generally given in literature as the botanical name of the May or Hawthorn of England, but the common wild species is **C. monogyna.**

Sarvice-berry is the correct spelling, not service-berry as generally given; it is a corruption of **Sorbus.**

In Bohemia, the Maytree is replaced every three, four, or five years; the Bohemian Mayflower is the true or English daisy, *Bellis perennis*. In most lands the tree or pole is replaced annually; it is generally completely stripped of foliage, although in some provinces the top of the crown is left intact. When a community Maypole is renewed yearly, it is sometimes solemnly burned during a special ceremony after the festivities. In certain Slavic lands the Maytree, which is usually a birch, is later dressed in woman's raiment and thrown into a stream in order to assure a plentiful rainfall in the ensuing season. Among the trees that are used as Maypoles in different lands are the narrow-leaved elm, fir, maple, oak, pine, European mountain-ash or rowan, spruce, and willow. The Maypole is usually ornamented with gaily colored streamers, tinted eggs, wreaths, flowers, hoops, spheres, food, dolls, and other offerings. In Sweden and some other lands the Maytrees and Maypoles are very small, between six and twelve inches in height, and are carried in joyful processions.

In France and elsewhere, the planting of a small tree on May Day in acknowledgement of a betrothal evolved into the planting of a tree or long-lived bush on the occasion of a wedding or birth. It was believed that the well-being of the married couple or child was connected with the health of the growing plant. By noting the rate of growth and condition of the "plant-twin," the parents and

friends could tell the condition of a person or couple who were away. When the plant sickened or died, the person was believed to be ill or to have passed away.

Another colorful May-day custom is the placing of small flower-laden baskets on doorknobs and over entrances to homes and barns in order to drive away evil spirits and to inaugurate the coming of spring. In many European countries young ladies gather Maydew before sunrise on May Day. This "magical" cosmetic is carefully collected in bottles for use during the year, to enhance their complexions and to make them fair. In all lands the flowers and sprigs to be used on May Day are gathered and woven into garlands before the sun rises; they are used in processions and as decorations when the sun is high overhead. It is deemed extremely unlucky to bring into the house, stable, or barn any item used in the May-day celebrations.

Nosegays of the lily-of-the-valley, the Mayflower of France, are exchanged between sweethearts and friends on May Day; they are worn by both men and women. Another French custom, also followed in other parts of Europe, is for bands of boys or girls, or mixed groups, to go from house to house, dancing and singing songs in praise of May. In some of these processions, one or more carry huge baskets. When a householder places a May-offering in the basket, such as eggs, bacon, sausage, cakes, money, or other token of food or plenty, the celebrants bless his home by attaching a garland or sprig of greenery over his doorway, or by planting a small tree on his grounds.

In Italy the month of May is known as the Madonna or Mary's month. The altars are decorated in white and blue,

(Continued on page 102)

HERB WITCHCRAFT

By GERTRUDE B. FOSTER

Mrs. Philip Foster is Editor of *The Herb Grower Magazine.*

"It was my father who taught me the spells of a white witch that my mother had known," she said. "Always they must be handed on from man to woman and from woman to man."

White Witch by Elizabeth Goudge

UNFORTUNATELY, my son is more interested in engineering than in plant superstitions, so it will have to be my daughter who carries on my interest in plants which are associated with dispelling the Evil Eye or in putting witches to flight. A recent issue of *Today's Health,* published by the American Medical Association, illustrates art objects of primitive peoples, who created them in the belief that they would harbor spirits to cure ailments and reveal the disease causing demons. The figures, which belonged to E. R. Squibb & Co. before they became a part of the permanent collection of The Brooklyn Museum, have been on exhibit at recent meetings of the American Medical Association in New York City and Denver, Colorado. Alongside them might be put some of the modern instruments of quackery which have been collected from today's market by the United States Pure Food and Drug Administration, just as a reminder that we are not too enlightened even in the space era.

Every gardener grows a few of the herbs that were used in spells or brought into cultivation for their imagined effect upon witches. Of course, in all innocence of their legendary powers, they could not do much towards protecting their owners today because, as Richard Folkard in *Plant Lore, Legends and Lyrics* says, "The chief strength of poor witches lies in the gathering and boiling of herbs." If you simply plant parsley and serve it as a garnish, it can't do you much good—you won't even get the vitamins A and C so abundant in it, if you don't eat it regularly. Parsley's association with the Devil begins with its germination which, the old saying goes, cannot be accomplished until it "goes to the Devil nine times and back." Of course, if you soak parsley seed in hot water before planting, you might fool Beelzebub. Have you ever been admonished not to clean your glasses after chopping parsley for salad? Folkard repeats the notion that if, after the housewife has bruised some sprigs of the herb in her hands, she should attempt to raise her glasses, they will snap and suddenly break. The ill effects of parsley can come before or after the fact. In Greece it is associated with funerals, and Plutarch tells of panic among Greek soldiers marching against the enemy when they met peasants leading mules laden with parsley. The unfortunate effects of transplanting parsley (stunted plants usually result, in my experience) were credited to an "offence to the spirit of the parsley beds" in Devonshire.

As with so many of the herbs, parsley was honored as well as feared. Crowns of the green stuff were presented to Greek athletic heroes. Sometimes, however, the crowns were of dried and withered parsley in memory of a legendary tragedy wherein an infant son was laid down by his nurse on a parsley bed and there bitten by a serpent. Guests

wore crowns of parsley to give themselves a feeling of beneficence and to increase their appetites. From descriptions of the dinner parties of those early days, our cocktail parties seem rather mild.

Of the plants antagonistic to witches the only one I can report upon from actual experience is the mountain-ash or rowan *(Sorbus aucuparia)*. On the day on which I added two of these trees to my garden, the member of the Girl Scout Committee who was most likely to cause dissension telephoned that she couldn't attend the meeting that evening! Folklore claims that a piece of the wood of rowan was enough to protect its bearer from ill-wishes, while a whole bunch of its leaves draped around a cow's horns would protect her from the Evil Eye.

The country custom of affixing a branch to the peak of a new building, called a roof-tree, must have come from the belief that hazel, elder, and juniper could protect a building from all harm including lightning. Even the lowly houseleek or sempervivum was supposed to have the power to protect a thatched hut from lightning, but the juniper was the best of all because it once sheltered the Virgin Mary in her flight from Herod.

How did certain plants and not others come to be the instruments for foiling witches and evil spirits? Probably because certain species, such as St.-John's-wort, *Hypericum perforatum,* display characteristics that are definitely taboo to the old crones. The yellow flowers of St.-John's-wort suggest the health-giving rays of the sun, so were thought to be inimical to witches. Then, too, the curious pellucid dots on the leaves set the plant apart from other herbs. These may have been taken as a sign that the oils of the herb are effective in closing open wounds or punctures. In England and Europe the herb would be in bloom on June 23, or St. John's Eve, when it and other wild herbs were gathered to serve as fumigants upon the bonfires burned that night. By jumping through the smoke from such blazes the country-folk insured themselves against harm the next year. If dew from the night before was collected from *Hypericum perforatum* on St. John's Day, it made a strengthening eye-wash. Is this, I wonder, how the origin of the expression "eye-wash" arose as a term of derision?

What of the plants loved by witches? Have they gone out of fashion in gardens as a result of such beliefs? Not at all. The very herbs which should put enchantresses to rout have been used in their potions and brews, for any magic worth its salt should be sufficient to protect a witch from being bewitched. Mistletoe, vervain, moonwort, mandrake, deadly nightshade, celandine, and St.-John's-wort, too, might be stirred, as occasion required, into their hell-broths, philtres, and potions. If priests were called in to exorcize them, the witches might hop upon their branches of broom and skim away to another county. Fern seed, taken on the spot, would render the spirits invisible if no means of locomotion were present.

Geoffrey Grigson, in his enchanting *The Englishman's Flora,* tells how herbs were planted in graveyards to increase their medicinal properties. Belief in the efficacy of such plants continues to this day in Ireland. It was but one step further to the belief that certain plants developed their powers by springing from the spot where the blood of heroes had been spilled. As Grigson says, "Antiquaries catch hold of the name and the legend, misinterpret the one and enrich the other; and the enriched or altered legend becomes a new article of popular faith."

BASIL STORY

By ELEANOR P. CHALFIN

Mrs. Bruce Chalfin, a member of the Herb Society of America, has a fine collection of herbs at Plantation Gardens, Rustburg, Virginia.

THE HERB ENTHUSIAST who has an undeviating and one-track habit of growing only a few edible kinds misses more than half the fun of this rewarding hobby. It has often been said that herb gardening is a way of life; I have found it a way of thinking. Those gardeners who seek material gains only, and they are legion, would get far more out of the pleasant, and sometimes exhausting, pastime of growing herbs if they would take the seasoning scales from their eyes and examine herbs from all angles. The collector becomes a connoisseur by trying sundry herbs, subsequently makes up his mind what to grow and not to grow, and never puts all his endeavors into one garden-basket. To follow the vogue for culinary herbs, and to stick to these exclusively, does not lead very far; the gardener becomes sheeplike and hide-bound and takes a dim view of wider horizons. It is the real herb-hound who tries to track down all the rare sorts on which he can lay his hands, sometimes collecting all available species and varieties in one genus; he finds that the longer viewpoint removes the drudgery from gardening and leads him down interesting byways which cross the usual beaten path.

The perennial herbs, such as lavender and rosemary in all their many forms, offer broad scope, but basil is the only group of annuals that gives so much leeway to the treasure hunter. One may take a cook's tour of the culinary basils, or one may admire them from the artist's standpoint, or sniff them with a perfumer's nose: all these qualities belong to the basil clan and raise it above the vegetable-garden level.

The Greeks had a word for it: basilikon,* meaning something royal or kingly. This indicates that ages ago basil was important and admired for more than its medicinal uses. Its history is interesting, a topic deserving an article of its own, but I must get on with my own basil story.

This began some years ago and is colored with happy

memories of the quest for these pleasant plants, which has gone on and on. Some years ago, when our nursery first hung out its herb shingle, my brother—then an herb grower himself—came to its aid with six varieties: sweet basil (the commonplace one), bush basil, lemon basil, holy basil, lettuce-leaf basil, and purple sweet basil. As basils are among the longest-growing annuals and need mild climates for full maturity, we found that southern Virginia was ideal for them. Success was sweet, our curiosity was aroused; we poured over botanical books, combed catalogues, did armchair traveling and deskchair correspondence in order to track down more of the genus *Ocimum,* and thus try to make the different basils our specialty. Luck played a big part, and so it was more this than good management which brought further "grist to our mill."

After only a few years of raising half a dozen kinds, Isabelle Henderson, a portrait painter and herb hobbyist of North Carolina, sent us several varieties which she had obtained from a seedhouse in Italy. And so we have ever since been grateful to Mrs. Henderson for purple curly-leaf, purple bush, and purple dwarf basils. Later, from the same source, we obtained a form of sweet basil *(O. basilicum)* with much narrower leaves and shorter stature, but the same flavor; we ourselves call this form Italian basil to distinguish it from the ordinary, well-known kind. A tiny-leaved dwarf basil was the next pearl added to our lengthening string, and this also came from Italy.

Next a small sack of basil sprigs, dry and big with seed, was sent us for identification. This proved to be a delightful and valuable addition, for the large, wide, and handsome leaves were becomingly displayed on the big and buxom plants, instead of growing low and cabbage-like in the manner of the "lettuce-leaf" basil; the floral sprays were much larger as well, and so, in place of niggardly returns, copious harvests of both leaf and seed resulted. No doubt this is the basil grown commercially as dried seasoning because of its broad leaf and lush growth; it is often called "sweet basil," which makes for the gardener's confusion.

This continuing luck in the basil field not only fed my fires for collecting, but also inspired my very first published article—a fanciful tale about an animated basil seed, its adventures from seed to plant and back to seed. But coming to earth again—Mother Nature's magic finger brought forth a new basil-resident in our garden. This changeling, or sport, which popped up unbidden, was an unexpected reward. It is a short and plump plant with purplish foliage. The attractive pink flowers are its best feature, for they form a wide, dense crown, the very short sprays in a cluster-formation giving a tufted effect. We catalogue-christened it "cluster basil," for want of proper botanical classification.

Then chronologically came the giant African basil, an unfamiliar variety which was passed on to us by my sister-in-law, Gertrude Foster. She reported that this is a perennial in its native haunts and hoped it would prove permanent in our milder climate. Unfortunately, this basil has not only let us down badly in this respect, but refuses to set seeds except in certain seasons—and this in spite of our many bees, both domestic and wild. But since we do not find its flavor or fragrance attractive, why should our winged, pollinating friends? I must add, however, that our pet cats found the African basil as fascinating as the holy basil, and they do have a similar scent seldom pleasing to the human nose. This reminds me that for years I've heard of a "black basil," reportedly growing in India, and I've wondered whether this type was also a sacred plant. My guess is that it may possess hand-me-down characteristics from holy and purple basils as parents. My magnet for basils has yet to attract the elusive one into our fold.

Only last season three more basils appeared in our garden scene. The French bush basil 'Vilmorin' arrived as a gift package of seed from Elizabeth Lawrence, author of many notable garden books. A trial plot of 'Vilmorin' gave very pretty compact plants, with dainty green foliage and short, short floral sprays.

The second entry was a garden discovery of a college professor in Connecticut, who kindly sent us a package bearing the fancy name of 'Dark Opal'. This sport was made available to seedsmen, not for growing but for resale, and so our token planting had to be for our own amusement and amazement. Now that the All-America Selection wraps are off and the introduction chatter begins, I feel free to make a few descriptive comments. 'Dark Opal', an ornamental variety, has deeply indented purple foliage, about the height and width of holy basil, and lavender flowers. This link in the chain of basils, because of the promotion about it, may put *all* basils on the map, by proving to the public that the run-of-the-mill sweet basil is not the one and only, as is far too often supposed.

A quick report on the third addition to our garden last summer: a volunteer sport. It was segregated from its fellow basils and developed into a dwarf-size green basil with pink flowers—an entirely new combination of colors, and one worth watching.

More odd strains must be lurking in the shadows, waiting to be brought forth so that gardeners may enjoy them. I continue to hope that others will come my way—I even dream of a gray-leaved, yellow-flowered basil, but I'm afraid it would have to come from another planet! In any event, trying to improve the basil image and to collect natural hybrids—I hope there will be no crossbreeding by human hands—will continue to be an absorbing project. And yet, strange to say, I am not a basil-eater. Perhaps this is my British blood, for the English grow basils for their fragrance and garden beauty rather than for flavoring foods.

A check list of the basils follows, with their approximate sizes, since their growth differs from area to area, season to season, and soil to soil. The groupings are dictated by my own tastes and observations.

(Continued on page 102)

*The name "basil" has had a confused history. The plant was known to the Greeks of classical times as *okimon* (ὤκιμον, transliterated into Latin as *ocimum*). The later Greeks used the word *basilikon* (βασιλικόν), a neuter adjective meaning "something royal," derived from the word for "king." But at about the same time the ancient scholars took up the Latin word *basilisca*. This was a plant reputed as a cure for venom; the name derived from *basiliskos* (βασιλίσκος), "little king"—by which flattering title they spoke of the fabulous and venomous serpent known to us as a basilisk. Dioscorides and later herbalists identified all three names as referring to the same plant, and included its supposed powers of preventing death from the bite of poisonous snakes and the sting of scorpions. Our word "basil" is therefore a sort of hybrid, with at least two ancestors.

SOME NATIVE WILD FLOWERS OF NORTHERN VIRGINIA AND THEIR USES

By NANNETTE M. STRAYER

Mrs. James Strayer, who has been writing and lecturing about herbs for almost fifteen years, has grown one hundred and fifty kinds in her herb garden and also has a wild-flower herb garden of unusual interest.

THE BOGGY MEADOWS and the rocky woodlands become alive if we are acquainted with their flowers. The more we study and learn of their history, the role they have played in past years, the closer all nature comes to us. There is rarely a plant without an interesting background. How did it get its name? What are its uses? Is it serving mankind today as food, as medicine, or in some way industrially?

There is no aspect in life in which native plants have not shared—in folklore, mythology, music, art, science, religion, industry, medicine, and even war. Their history is woven with that of man himself, a part of his very being.

Many of the plants that grow along the roadside and streams, in the meadows, and in our own backyards, are termed weeds. It is true they often encroach upon their more aristocratic neighbors, but as Emerson said, "A plant is a weed until its virtue is known, it then becomes an herb." Many of these wildings we pass by as weeds are the basis of important medicines.

Medicine has gone far since the days of Hippocrates, Galen, Dioscorides, and Pliny. Each of the great Greek and Roman philosophers has contributed his share of study and knowledge to the state medicine has attained today.

In the early centuries medicine was fraught with superstition and mysticism. Medicine as we know it (more or less freed from superstition) was started in the fourth century B. C. by Hippocrates. It is thought that before Hippocrates the practice of medicine was in the hands of priests who served in the temples of Asclepias: in Greek mythology he was the god of medicine.

Prayers, hymns, incantations, and charms played a prominent part in the treatment employed by the priests. The temples were situated in lovely sylvan spots, preferably in the neighborhood of a spring. Abstention from wine, fasting, and sleeping before the altar were part of the regime. The Asclepiads are said to have originated the phrase, "Cure safely, entirely, and pleasantly." This was used as a motto for prescriptions as late as the nineteenth century.

Hippocrates paid special attention to diet and was versed in the preparation of herbs. He tried to divorce medicine and surgery from the supernatural. Of the four hundred simples used by him, half of that number are still in use today.

Five hundred years separate Hippocrates from the great doctor in Greek medicine, Galen, private physician to Marcus Aurelius. Galen had a remarkable knowledge of anatomy. He wrote about five hundred treatises on medicine and logic, about eighty-three of which have been preserved. His teaching was followed for fourteen centuries.

Another great name in the history of medicinal herbs belongs to the early part of the first century A. D. and is that of the Greek physician Dioscorides. His *Materia Medica* contained as many as six hundred plants and was the source of herbal therapy for sixteen centuries.

During the sixteenth century the theory of the doctrine of signatures was conceived. Those who accepted it believed that nature showed by the shape of a leaf or flower or fruit, and where and how it grew, its uses for mankind. Such plants, of which the liverwort *(Hepatica)* is an example, were called worts. As its leaf resembles the shape of the liver, hepatica was thought to be a remedy for any liver complaint.

In the households of our grandmothers these plants were in common usage. In fact, many of the simples are still used today among the country-folk of many lands. In Colonial days every medicine closet contained remedies made of herbs. Synthetic drugs were not then known. The precious recipes were handed down from one generation

Jamestown weed *(Datura stramonium).*

to another. The more affluent households boasted an "herb woman" who did nothing but attend, dry, and concoct herbs for seasonings, cosmetics, and medicines.

Virginia is rich in her native flora, for there is wide diversity in her topography. There are lakes, mountains, valleys, boglands, lowlands, and a long seashore. The following are but a chosen few to demonstrate what a mighty service plants have rendered to mankind. As we drive along shady country roads during the month of May, we come across great patches of the May-apple or, as it is often called, the mandrake. However, this is not the true mandrake and should not be confused with the mandrake of superstitious and dark magical powers: the true mandrake belongs to the poisonous *Mandragora* of the *Solanaceae* or Nightshade Family. May-apple *(Podophyllum peltatum)* belongs to the *Berberidaceae* or Barberry Family. Its other common names are umbrella plant, devil's apple, duck's foot, and wild lemon. It is a perennial herb which grows luxuriantly in damp and in dry woods. In the fork of the stalks of its large leaves are the snow-white, cup-shaped flowers. Its lemon-shaped fruit, when ripe, has a sweetish, peculiar taste, agreeable to some; it may be eaten with impunity. The leaves are poisonous when eaten. Its medicinal virtues are wholly confined to the root, which contains a resin called podophyllin, a thorough but slow-acting purgative. The crude drug is never given alone; it needs careful combination with other herbs. It acts upon the liver, as does mercury, but is far less harmful.

The Indians first discovered the virtues of boneset *(Eupatorium perfoliatum)* of the Composite Family. It is also known as thoroughwort, crosswort, Indian sage, and ague weed. One of the features that aid in recognizing boneset is the peculiar arrangement of the leaves. These are opposite and joined together at the base around the stem, so that they have the appearance of a single leaf with the stem passing through the center of it. The leaves and flowering tops are used in medicine; they have an aromatic taste, bitter and very astringent. As indicated by the name, ague weed and feverwort, this plant was and still is used by country-folk as a remedy for fever and ague. Brewed as a tea, it is given for colds, dyspepsia, and jaundice, and old herbals and doctors' books recommend it highly as a strong tonic or "strengthener" to the stomach. It is said to be a pure relaxant to the liver. The purple boneset, or Joe-Pye-weed, is a lovely plant which colors our roadside in the fall. The flower is pale lilac with a pearly sheen. This eupatorium is said to have been named after Joe Pye, an Indian doctor in Massachusetts, who used it for the ague.

The partridge-berry or squaw-berry *(Mitchella repens)* of the Madder Family is one of nature's loveliest groundcovers. This little evergreen, found in the deep woods, sets a bounteous table for winter birds. The flowers are dimorphic and joined in pairs at the base; it takes two flowers to make one fruit. The fruits of the previous year are often found among the waxy, fragrant flowers. The leaves are very smooth and glossy, often veined with white. This is a very special plant with the Indians. The leaves and fruits are dried and used in a tea which is given to their pregnant women for months before delivery; they claim the tea from mitchella is the reason why they have such ease in bearing children. It is still listed in the *United States Dispensatory* and is said to be useful for dysentery, also

Boneset *(Eupatorium perfoliatum).*

beneficial to the generative organs, and for the menopause.

The Jamestown weed *(Datura stramonium)* was first noticed by the original settlers of Virginia at Jamestown, from which circumstance it acquired one of its names. Other common names are jimson-weed, stink-weed, and thorn-apple. It is a rank-smelling and poisonous herb, but is of utmost importance medicinally. It may be detected, even at a distance, by its ill-smelling odor. All parts of the plant are poisonous, but the seeds are more energetic in their action than the leaves. In spite of the abundance of the plant in the wild, it is being cultivated in order to obtain the drug, stramonium, of uniform quality; we import over five hundred thousand pounds a year from abroad. It is used principally in preparations for asthma and bronchitis. Stramonium and belladonna are similar in the effects produced by their toxicity and their therapeutic action. The Nightshade Family, to which *Datura* belongs, includes the potato, tomato, and eggplant, and *Atropa,* the source of belladonna.

In the month of June, northern Virginia roadsides are a glorious sight with the heavenly-blue chicory *(Cichorium intybus)* of the Composite Family. It also is known as succory. If there is any fault to find with this lovely wilding, it is that its flowers open for only half a day; they usually close in the afternoon, unless the weather is cloudy. A tea made from this plant is very beneficial to an upset stomach. Chicory is also used for jaundice and liver disorders, and is said to be good for rheumatism. Added to coffee, chicory counteracts caffein and aids digestion. We import thousands of pounds of the powdered root from Europe, where it is grown as a cultivated crop. The leaves are delicious when cooked and served like spinach, and the young tender leaves may be used in salads. The leaves bruised and applied like a poultice to external conditions are helpful.

To appreciate the one-time popularity of the stately herb *Verbascum thapsus* of the Figwort Family, one has only to recall some of the thirty-odd homely names given this plant by country-folk: beggar's staff, Jacob's rod, longwort, hare's beard, Aaron's rod, velvet-dock, blanket herb, Adam's flannel, torches, Roman candles, and hag's taper, the last for its use by witches. The Romans called it candelaria from their custom of dipping the long, dried stalks in suet and using them as a funeral torch. The Greeks used the leaves for lampwicks. One of its oldest common names, bullock's lungwort, reminds us that man learned its uses from watching cattle eat verbascum when they were afflicted with a cough. By whatever name it may be called, it still remains a distinctive wilding because of its thick velvety or flannel-like leaves; soft as down, they were put inside of shoes to keep the feet warm.

The species *Verbascum thapsus* was undoubtedly introduced from Europe. It has been used for generations for pulmonary disorders. The leaves are dried and smoked like tobacco for asthma. Sometimes a handful of them is placed in a teapot and the steam inhaled through the spout as a relief for nasal congestion or catarrh and throat irritation. A fomentation of the leaves in hot vinegar and water makes an excellent application for external irritations. Mullein syrup, made with honey and molasses, is still the remedy for coughs in many a country household. The Dela-

May-apple *(Podophyllum peltatum).*

ware Indians bound the leaves about their arms and legs to relieve ague; the thick, soft, woolly leaves kept these parts warm. The powdered leaves were used for a tea, taken several times a day as a heart stimulant. Frequently it was used for rheumatism. It is no wonder that our ancestors included this plant in their physic gardens.

Verbascum also spreads a sumptuous table for the bumble bees, and they work earnestly in harvesting the pollen of the yellow flowers. They are so covered with the golden-yellow dust that one marvels how they ever fly. As I have watched them gathering the precious pollen grains to set the seed of so many fruits and flowers, it has brought to mind Maeterlinck's lovely verse:

> "The play of stamens and pistil, the seduction of perfumes, the appeal of harmonious and dazzling colors, the concoction of nectar—that is to bring to the flower the kiss of the distant, invisible, motionless lover."

Verbascum thapsus is found in rocky pastures and along roadsides in soil in which most plants would perish; if transplanted and given a little fertilizer, it responds well and makes an interesting background plant. One peculiarity about its tall flower stalks is that only a few flowers open at a time. The basal leaves form a beautiful rosette and are artfully employed in flower arrangements.

Few plants add more vivid color in midsummer and early fall to northern Virginia's roadsides and meadows

than the butterfly-weed *(Asclepias tuberosa)*, also known as pleurisy-root and wind-root, of the Milkweed Family. It resembles the common silkweed, for which the plant is sometimes mistaken; however, the flowers of the silkweed are of a pale lavender hue, while those of the butterfly-weed are a beautiful, bright orange and are succeeded by long slender seed pods. It has long been celebrated in Virginia and the Carolinas not only as a powerful remedy for pleurisy, but for diseases of the lungs. In olden times many families resorted to the powdered root to relieve pain in the stomach and as an aid to indigestion and cholic, and for those reasons it was called wind-root. The Indians used it as food and prepared a crude sugar from the flowers. Mrs. William Starr Dana in *How to Know The Wild Flowers* states, "At a Centennial Exhibition, much attention was attracted by a bed of these beautiful flowers, which were brought from Holland." She says, "Truly flowers, like prophets, are not without honor save in their own country."

Hypericum is a large genus of plants, of almost two hundred species, in the temperate and subtropical regions of the northern hemisphere. They are herbs or shrubs with cymose yellow flowers; the numerous stamens are, in some species, united in clusters of three or five. The leaves, a dusky green, are without stalks, the blades growing right out of the main stem; in many species, they are marked with transparent dots.

Common St.-John's-wort *(H. perforatum)*, a native of Europe, is now extensively naturalized throughout the United States. There are perhaps more superstitions about St.-John's-wort than any other herb. It was gathered on St.-John's Eve (June 23) and was hung at the windows and doors as a safeguard against thunder and lightning and evil spirits. "A belief prevailed that on this night the soul had power to leave the body and visit the spot where it would finally be summoned from its earthly habitation: hence the all-night vigils which were observed at that time."

Poets and physicians alike extolled its properties. An ointment, made of its blossoms, was called "balm of the warrior's wound." Early pioneers bathed external wounds with a tea made from the dried plant, and it is said to have soothing effect on bruises and insect bites. Before synthetic dyes, this plant was used with alum to dye wool a yellow color. Its yellow flowers brighten the meadows and roadsides nearly all summer, but to the farmer it is a pernicious weed. It is a pervasive wanderer.

King's clover *(Melilotus officinalis)* of the Pulse Family, and one of my favorites, grows in the most unexpected places. I am never surprised to come upon it along railroad tracks and meadows, but I was startled last summer to find it happily at home on the outside of a fence along a city block. I welcomed it with unabashed joy, for it is a fine addition to a flower arrangement. When dried, both the leaves and foliage are sweet-scented. The small pea-shaped flowers grow in sprays, on one side of the stem only, close together and slightly drooping. The leaves have long stalks and are cut into three narrowly oval leaflets with toothed edges. It is a plant to allure bees, for its fragrance is pronounced; even a small bunch will perfume a whole room. When the flowers and leaves are dried, they have the peculiar fragrance of the tonka-bean and of sweet woodruff, because of the presence of coumarin. King's clover is excellent in potpourri. In Switzerland it is used to flavor Gruyère cheese. In America country-people put it among their clothes to perfume them and keep away moths. In olden days it was used as a medicinal and sold by the herbalists as balsam-flower. "Made into a tea it is warming to the body and helpful to the kidneys."

The generic name *Melilotus* comes from the Greek words for honey and lotus. It is called melilot, as well as king's clover, but is universally known as yellow sweet clover.

Along my northern Virginia city block of wildings which kept me in flowers all summer (I counted ten different species), the yellow melilot bloomed until the middle of August, then seeded and died down. One day to my astonishment I saw the white melilot in full bloom; I had never seen this species *(M. alba)* before. I found it much more fragrant than the yellow, in fact cloyingly so. I could not keep the cut flowers in the room at night; perhaps, as do most flowers, it gives off its strongest perfume at evening to attract those little night creatures that are helpful in pollination. Next summer both melilots will be added to a potpourri.

Dr. Boteler said of strawberries, "Doubtless God could have made a better berry, but doubtless God never did." The cultivation of the wild strawberry, *Fragaria virginica* of the Rose Family, began about the fifteenth or sixteenth century. The small red berries, sweet and fragrant, were used as a blood cleanser and alkalizer. The whole herb is an astringent and tonic for convalescents and especially children. The dried leaves contain iron and are still used today as a tisane. A tea brewed from *F. virginica* is suggestive of the cooked strawberry flavor rather than of the fresh. I drink this tea and serve it to guests exclusively. It is low in caffein and especially so in tannin. China tea has from thirteen to eighteen per cent of tannin, while herb teas have from one to three per cent. All herb teas are better served *au naturel;* milk clouds them. If any sweetening is desired, it should be honey and not sugar. The dried leaves of the wild strawberry are best served as a tisane, plain: nothing should be added to detract from their own delicious flavor.

Strawberries were also used as a cosmetic in olden days. Mrs. C. F. Leyel in her book on *The Magic of Herbs* gives this recipe: "Bathe the face with the juice of strawberries; let it lie on. Wash in the morning with chervil water," and Gerard states, "The distilled water drunke with wine is good against the passion of the heart, reviving the spirits, and making the heart merry. Also the ripe strawberries quench thirst, and take away, if they be often used, the rednesse and heate of the face."

The ague-tree is *Sassafras albidum* of the *Lauraceae* or Laurel Family, famed for its fragrant plants. It grows along roadsides, in abandoned fields, and in light woodlands. It has held a fascination for me since childhood, when I would try to find the different-shaped leaves on the same tree. Its leaves have three forms: oval and entire; mitten-shaped, that is with one lobe on the side; and three-lobed, the larger lobe in the center. Frequently the three forms will be on the same twig. Sassafras is used for fencing and cooperage. The bark of its root is a powerful aromatic stimulant. An oil, distilled in large quantities from the

(Continued on page 114)

FRUITS AND VEGETABLES OF JAPAN

By ALMA W. BARKSDALE

Dr. Barksdale, Research Associate of The New York Botanical Garden, and her husband, Dr. Lane Barksdale, Associate Professor of Microbiology at New York University Medical School, spent a year in Japan. She continued her studies in *Achlya* in the Botany Department of Kyoto University, while he carried on research in the Universities of Kyoto and Osaka.

WHEN MY HUSBAND and I arrived in Japan in August, 1960, *ichijiku,* figs *(Ficus carica)* were ripening, and when we left, the figs were again beginning to ripen: we had lived in Japan for one year. With the changing of the seasons, a succession of fruits and vegetables appeared in the markets and restaurants, and we tried to taste them all. The firsts of the season of any fruit are valued highly by the Japanese, and they are offered as gifts to friends and neighbors.

In late summer, along with figs, there were *nashi,* sand pears *(Pyrus ussuriensis simonsii),* yellow, fleshy fruits that have the shape of an apple but the skin and gritty texture of a firm pear. *Nashi* were followed in December by persimmons, *kaki,* of the large sweet variety such as is now grown in California. Many homes in Kyoto, where we lived, had their own persimmon *(Diospyros kaki)* trees and in early winter, after most of the leaves had fallen, these trees attracted the eye because of their large clusters of bright orange fruit.

Mikan made their appearance before the persimmons had disappeared from the market, and their season lasted well into June. The *mikan,* which is called a mandarin orange *(Citrus nobilis deliciosa)* when exported, somewhat resembles a tangerine in color and looseness of rind and in its easily separable locules. We fell into the habit of eating a *mikan* whenever we were hungry, and our daily consumption became such that we imagined our skins turning yellow from the ingestion of excessive amounts of carotene, as has been known to happen to children who over-indulge in *mikan.*

Mikan, neatly stacked in green mesh bags, five to a bag, were offered for sale in train stations and on the crowded trains. Our fellow Japanese passengers ate *mikan* in a very delicate fashion, behind a cupped hand, biting into a section and eating only the inside, leaving the tough membrane, which was discarded with the rind. We indelicately ate all but the seeds and rind.

Besides the *mikan,* there are a number of other citrus fruits of which we liked best the summer *mikan.* It resembles a grapefruit in color and size but in flavor is closer to a Seville orange. *Yuzu (Citrus junos),* which looks like a small lime, is inedible, but the oil of its rind is pungent and deliciously fragrant, and it is used by Japanese cooks to flavor soups.

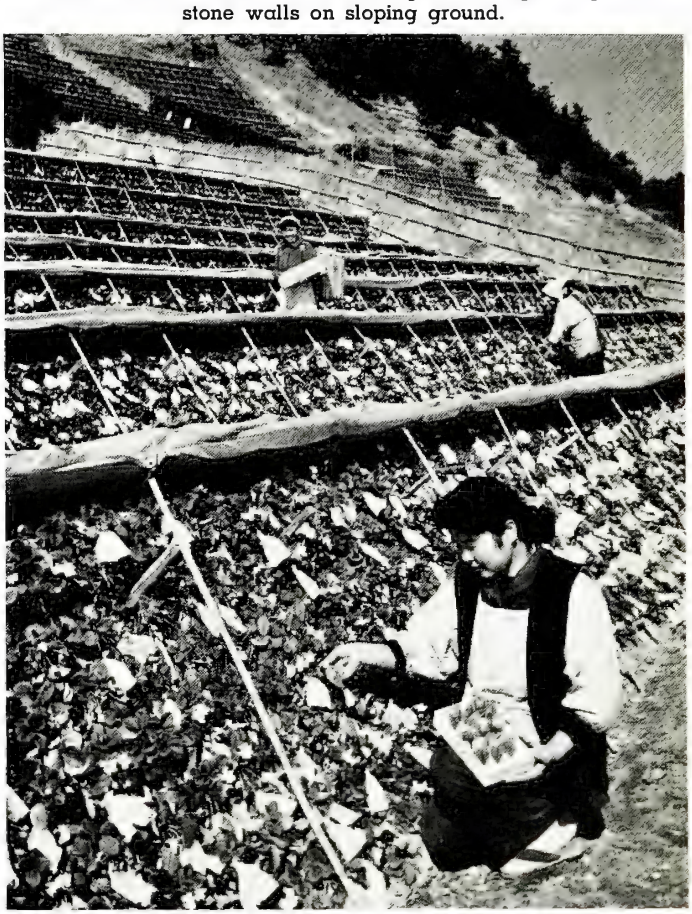
During the months of April and May we feasted daily on *ichi-go,* strawberries. The strawberry plant was introduced to Japan by the early Dutch traders. To westerners, the color, size, and delicious flavor of the Japanese strawberries are incredible. These berries come to market neatly arranged in rows in shallow, padded wooden boxes. Dessert in a restaurant during the strawberry season may be one or two perfect strawberries, two or three inches in length, served alongside a small mound of pulverized sugar.

In the latter part of April we journeyed with friends to the southern tip of Kyushu and there, around the base of a still active volcano on Sakurajima, in the bay of Kagoshima, we saw orchards of *biwa,* loquats *(Eriobotrya japonica).* The fruit had been enclosed in white paper bags, and from a distance the trees appeared to be covered with huge white blossoms. Two weeks later in Tokyo we bought some of these loquats, the firsts of the season.

We spent a weekend in mid-June in Kochi, a town on the southern coast of the island of Shikoku, and in our inn we were served the fruit of *momoyama,* a tree which grows wild in the vicinity of Kochi. This is the mountain peach *(Prunus tomentosa).* As the fruit is very perishable, it is not shipped to the other islands of Japan and so can be eaten only on Shikoku. The fruit of *momoyama* is the size of a cherry, and dark red and pitted like the cherry, but the flesh is soft and papillose.

Many varieties of delicious melons are grown in Japan,

The "barrel" method of strawberry cultivation has been adapted to field use; here strawberries are grown in specially built stone walls on sloping ground.



some of which are more closely related to the gourd or cucumber than to the honey-dew and Persian melons with which we are familiar. A melon similar to the Persian melon, though smaller, is displayed in fancy fruit markets with a bow of ribbon tied to its coiled stem. One melon costs two or three dollars, depending upon its size, and it comes "gift-wrapped" in its own wooden box.

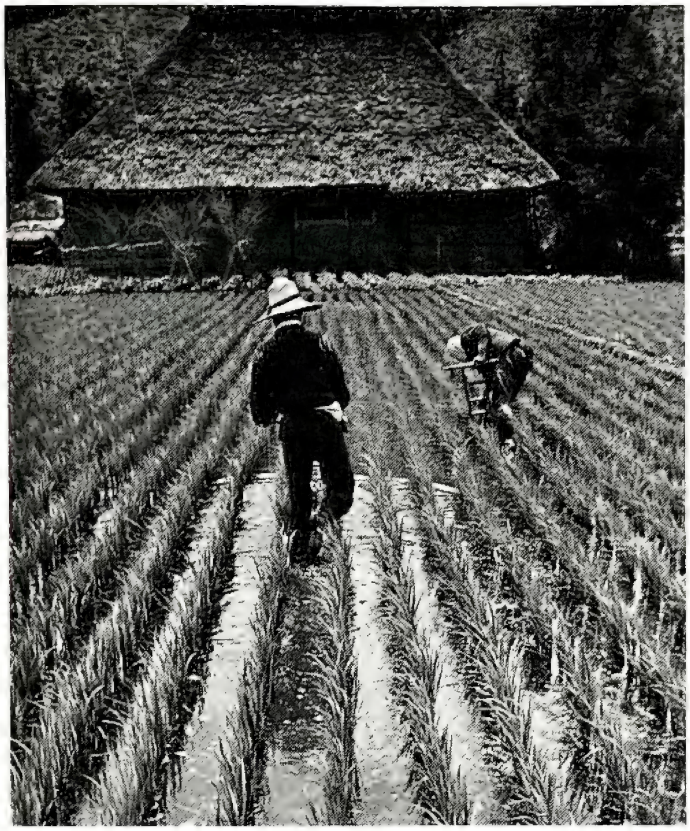
To us the strangest of the cucumber-like melons that mature in midsummer, is one called *maku wa uri (Cucumis melo* var. *conomoa)* an egg-shaped fruit, about the size of a large avocado, with a smooth, greenish yellow skin. It is peeled before it is eaten and halved so that the seeds may be scooped out. Its flesh is slightly sweet, not very juicy, and of a texture intermediate between that of a cucumber and a summer squash.

The finest white peaches of Japan are grown in the vicinity of Okayama in valleys and on hillsides which look out to the Inland Sea from the western shore of Honshu. In late July we took a train that passed through Okayama and on the station platform there were hand-carts piled high with baskets of *hakuto,* the Okayama peach. We bought two of these (in Japan one always returns from trips with a supply of "small gifts") each containing about a dozen large peaches, individually wrapped in paper-covered quilts of excelsior. The baskets were loosely woven of strips of green bamboo and were lined with paper. The hinged lid of the basket was fastened by a bamboo stick, thrust through two loops, and there was a gracefully curved handle by which the basket could be carried on the arm. These handsome baskets were further evidence of how the Japanese excel in the art of packaging.

In Japanese homes and inns, breakfast may begin with the eating of a sour plum, *ume boshi (Prunus mume).* Early in the spring, the plums are packed in a jar with dry salt and after two weeks, they are spread out in the sun to dry on three successive days, each time being put back in their salty juice while yet warm from the sun. The plums may be dyed red by putting the leaves of a plant called *shiso (Perilla frutescens* var. *crispa)* in the jar with the fruit. If a plum is enclosed in the ball of rice intended for a picnic on a hot day in summer, the rice is said to be "preserved" by the acidity of the plum. When taken in hot water, the plum is considered an effective treatment for indigestion.

Unlike the fruits and vegetables which are eaten only in season, rice is eaten two or three times daily throughout the year. The only concession made by the housewife to the progress of the seasons is to cook the rice in larger

Japanese women gather mikan in Shizuoka prefecture. Fuji-san is in the background.



As soon as the rainy season ends, the farmers start weeding the rice fields.

amounts of water, as the grains of the last fall's harvest become drier. The ratio of rice to water for new rice is 1:1, and this ratio is gradually changed during the year until it becomes approximately 1:1.3.

Rice imported from Taiwan and southeast Asia is cheaper than the native rice, but those who can afford it prefer to pay the higher price for the home-grown product. Rice from different districts of Japan differs in taste and texture. It is not unusual for a mother to send rice to a son who is attending the university in a district where the rice, she believes, is inferior to that of his native district. Upon returning to America, we found that American rice had become distasteful to us, and we are now eating a Japanese variety of rice grown in the Sacramento valley of California.

Several varieties of rice are grown in Japan, and of these some are superior for the making of *sake* and *mirin,* rice wines, while others, the more glutinous varieties, are best for the making of *mochi,* a rice bread.

Mochi is made in homes and shops in preparation for the New Year celebration. The rice grains are boiled until soft, and are then pounded with a wooden mallet until they are fused into a fondant-like mass. If uncooked *mochi* is allowed to stand too long, it will set like cement and cannot be cut. When cooked, either by boiling, steaming, or toasting over a charcoal fire, the *mochi* swells and puffs and becomes taffy-like in consistency. It should be eaten in small pieces and with caution; death by strangulation on *mochi* is not unknown.

Two kinds of alcoholic beverages, *sake* and *mirin,* are made from rice in Japan. *Mirin* is a sweet wine, the sugar of which is obtained from the rice-starch by the action of the enzymes of the *koji* mold. In the manufacture of *sake,* the digested rice is fermented to alcohol but in the preparation of *mirin,* neutral spirits or *sake* are added to the sweet digest of rice, and the result is a sweet liquid that is delicious to drink and to flavor soups and sauces. *Mirin* is the ceremonial wine drunk at the New Year and at wedding feasts.

A sweet, non-alcoholic beverage, called *amazake,* is prepared from *koji*-digested rice. *Amazake* is a thick, white liquid, which is served hot and with a spoon or muddler for stirring to prevent the settling of the rice solids.

Traditionally, *sake* is made only during the cold months of the year, and it is then in the markets near *sake* breweries that one can buy *sake no casu,* a cake of rice solids made by pressing the residue of *sake* fermentations. This firm-textured delicacy, tasting strongly of *sake* may be used for flavoring various dishes. Our housekeeper prepared for us a hearty soup from *sake no casu.*

Whenever boiled rice is eaten, it is accompanied by several pickled vegetables. Almost always there are slices of pickled *daikon,* a kind of radish *(Raphanus sativus),* and with this there may be pickled cucumber or eggplant. My favorite was *narazuke,* a white cucumber stuffed with *sake no casu.*

The vegetable pickles may be bought in the neighborhood market, where they are displayed in large wooden tubs, or they may be home-made. In the fall of the year long white radishes are laid out on the roof or are hung by their leafy tops from the walls of the houses. From these radishes the family's winter supply of pickles is made.

Whereas rice is the chief source of carbohydrates in the traditional Japanese diet, beans, along with fish, constitute the chief source of protein. There is a large variety of beans, and these are prepared in many different ways. The beans may be sugared and very sweet or they may be fermented and quite salty. At New Year, *zen zai,* a sweet bean soup containing *mochi,* is made. The Japanese meal may be preceded by green tea served with a sweet (appetizer), which may be *yokan* or *manju. Yokan* is a very firm jelly made from a mixture of *azuki-sarashian,* a red bean powder, and *kanten,* agar-agar, which has been sweetened. *Manju* is a steamed bun filled with bean jam. Both red and white beans are candied, and these may be among the ingredients of the *o-bento,* the Japanese lunch box.

Soybeans, of which millions of tons are consumed annually, are made into such products as *tofu, miso,* and *shoyu. Tofu,* bean curd, is obtained by adding magnesium chloride to a water extract of soy beans. The curdled protein forms a soft cake, which is cut into squares and is kept submerged in cold water until used. It may be cooked by gentle warming in a soup or sauce. *Tofu* is peddled in the streets every morning and evening in small wooden carts, pushed by hand or drawn by a bicycle. The housewife comes out to the street, when she hears the *tofu* peddler's horn. Just before we left Japan, we were taken by a friend to a restaurant in Tokyo that had been making and serving *tofu* for two hundred and sixty years. The *tofu* of this resturant is especially fine, because the soybean extract is filtered through silk cloth. Our hostess ordered for us six or seven dishes, all containing *tofu.* We were replete with *tofu* when we left the restaurant.

(Continued on page 102)

CAMPANULAS

By HELEN M. FOX

Mrs. Mortimer J. Fox, who is a member of the Advisory Council of The New York Botanical Garden, has contributed articles on gardening to a number of publications and is the author of several books. Her latest—on *André Le Nôtre, Garden Architect to Louis XIV*—will be published by Crown Publishers Inc. in the United States and by Batsford in England late this summer.

FOR MANY YEARS I have been growing lilies, some having flowers with white, pink, or orange perianths, some spotted with red or gold, and others marked with a deep roseate or green line down the center of each segment. Some of the lilies reach to six feet or more, and others are low, only fifteen inches high. During much of this time I have been searching for and trying out companion plants. And now I have concluded that tall and medium-sized campanulas in blue-violet or white and rarely pink, mingled with brilliant blue *Delphinium grandiflorum* in variety, are the most suitable and harmonious plants to grow with lilies. The campanulas bloom from June, when *C. elatines* is in flower, to September, when *C. lactiflora* bears its second crop.

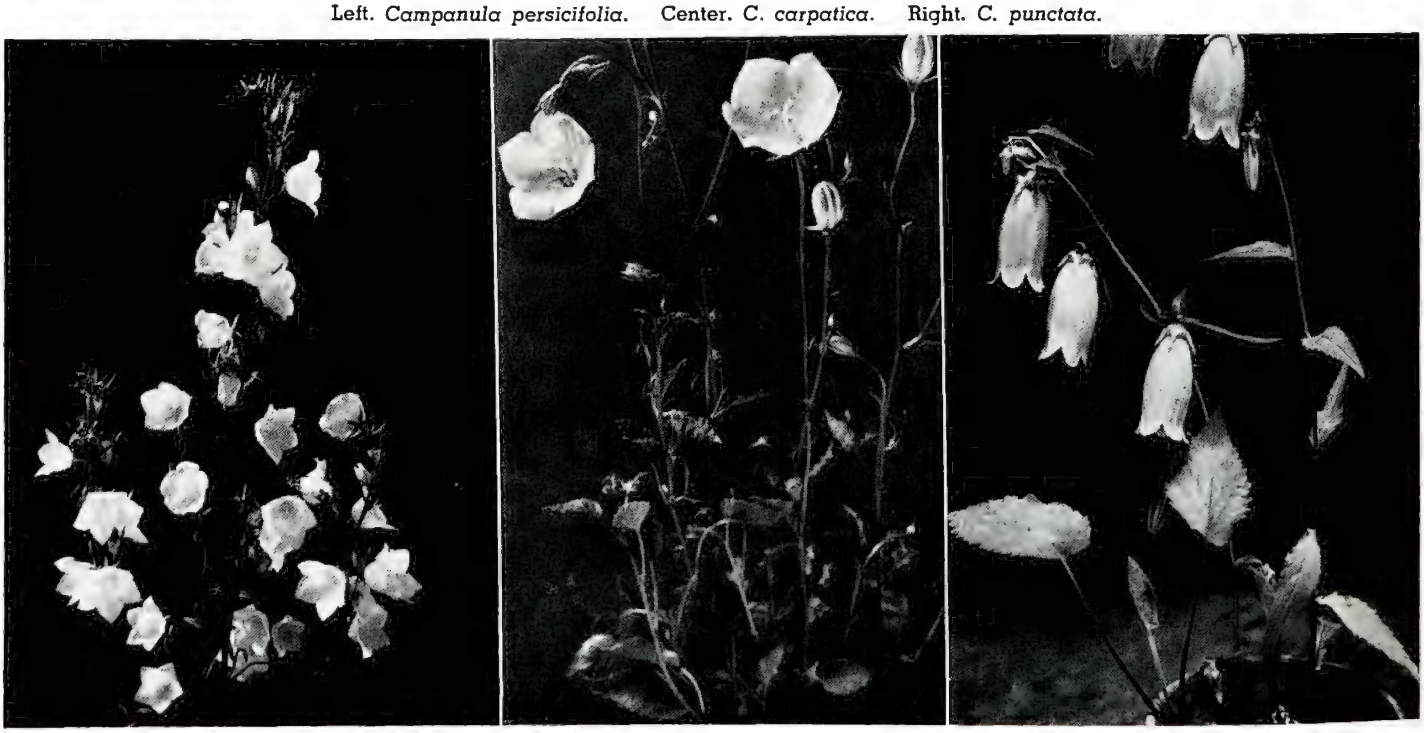
To secure seeds of campanulas I wrote to England, for not many of the genus *Campanula* are listed in our catalogues, and none of the species native to North America. In some years, during the past twenty, I have ordered seeds of five or more different campanulas at one time, and in all I have raised forty-one species and many varieties. Some I discarded, while others discarded me and my garden.

The trouble in raising these plants from seeds is that one does not always get the seeds of the species ordered. I have ordered *C. latifolia, C. patula,* and others of the tall and medium species only to find that instead of a rare and choice plant I had mothered *Campanula rapunculoides,* a sturdy plant to be sure but with the unfortunate habit of seeding itself hither and yon and sending out suckers under and through a whole bed of shrubs. Because of this habit, *C. rapunculoides* has naturalized itself along roadsides and on the margins of meadows and has become a nuisance in the garden.

At first I confined myself to the tall campanulas but gradually the entrancing dwarf species, much more difficult to maintain for they are truly rock-garden plants, were too alluring to resist. These can be interplanted with low-growing lilies and, of course, are charming by themselves. I ordered these difficult plants from nurseries in the Northwest that specialized in them, but the long journey in late spring was generally too severe; after they arrived and had been planted in my garden, practically all faded away. Besides, many were eaten by slugs. I do not have these pests as a rule, but the dainty low campanulas, as also the seedlings, attract them. Now pellets, called "snail and slug pellets," with arsenic as a principal ingredient, are scattered liberally among seedlings and young plants.

The genus *Campanula* consists of about three hundred species, native to temperate and tropical as also boreal regions. In his book, *The Garden of Bellflowers,* Dr. L. H. Bailey says that although they are called "blue," the flowers are actually violet. They have bell-shaped and sometimes wheel-shaped or tubular corollas, with the petals united at the base and almost always flaring at the tips, though sometimes lower down. There are five sepals, five petals, and five stamens. The filaments soon wither around

Left. *Campanula persicifolia.* Center. *C. carpatica.* Right. *C. punctata.*



The tall, handsome *Campanula lactiflora* blooms luxuriantly in the author's garden in Mt. Kisco, New York

the base of the pistil which is taller than the stamens and is three- to five-lobed, often looks like the clapper of a real bell, and sometimes projects beyond the corolla. The leaves are alternate, and sometimes they are only radical (basal). Some of these basal leaves are long-lived; others disappear as the flower matures.

Some campanulas are happy in the sun, others in the shade. A few are annuals, some are biennials, but most of them are perennials. Many can be increased by division.

Seeds of campanulas may be sown in February or March in clay pots in the greenhouse. When they are large enough (have their second pair of leaves), I transplant each seedling to a fibrous pot and set the pots in a cold-frame. They are left there until the following spring when, being thoroughly mature, they are planted out. This does not apply to the few annual campanulas which are planted outdoors as soon as the weather permits.

Just from habit, when writing about any plant, I first look it up in the *United States Dispensatory* or other source on herbs to learn whether or not it has medicinal or other herbal virtues. Many of the campanulas are said to have inulin in their roots: the roots of *C. trachelium* are edible, and an extract from them has been used as a gargle, and also as an astringent for cleansing and vulnerary purposes. The flowers of *C. rotundifolia* are considered to have anti-epileptic value.

Left. *Campanula carpatica,* blue and white forms, in the author's garden.

Below. *Campanula patula.*

According to Vilmorin-Andrieux et Cie in *Les Plantes Potagerès* (the best book on the vegetable garden in my experience) the spatulate basal leaves of *C. rapunculus* provide a pleasant salad—with this I agree—and the root is edible. The cultivated leaves are said to be more tender than those collected from the wild. According to the same source, other edible campanulas are *C. persicifolia* and *C. rapunculoides.* (I have always thought the stalks of both are tough).

Rampion *(C. rapunculus)* is biennial and will send up its flowering stalk the second summer. It needs staking. The stem is topped by a long narrow raceme of dainty flowers, each one-half inch long and five-eights of an inch across, having narrow sepals which are needle-like at their tips. The plants are sometimes two feet high. I usually grow it in the sun, but *C. rapunculus* has seeded itself in the shade at the base of the garden wall. I have had a white-flowered form, but it did not come true from seed. This species, native to Europe, western Asia, and Africa, is known as raiponce in French. It is said to have been mentioned in French poetry from the fifteenth century.

When I moved to my present garden, several plants came along in the soil around some shrubs, and among them was *Campanula punctata.* Its long, pendent, tubular flowers, dull white tinged tobacco-rose with lines and dots of a dusty mauve, look well in the half shade under dogwood trees and between lilacs and other bushes. On a herbarium sheet one botanist noted the flowers as being white and lavender, and several other writers seemed to have been annoyed with the coloring. However, many of my visitors are charmed by these campanulas. Perhaps I have a good color form, or the semi-shaded situation is becoming to the plants. *C. punctata* is said to be biennial; but it does not need to be renewed by my assistance, for it has scattered itself widely and has not failed to be present in such quantities that I have had to discard quite a few plants every year.

The much-branched stems are generally recumbent, twenty or so inches long, light yellow-green, with long green hairiness. Plum-red stalks carry the basal leaves, which are three inches across, thin-textured, crenately and unevenly toothed, and have long hairs along the margins. The stem leaves are without stalks and are hairy on the veins of the under surface. The flowers are borne in loose clusters or singly, and their stalks bend sharply just under the calyx. The calyx has long-toothed narrow sepals, one-third as long as the corolla. Between the sepals on the calyx is a fold. The corollas are two inches long, one inch across, and hairy inside. This campanula is native to Siberia and northern Japan.

A slender, refined version of *C. rapunculoides,* nevertheless weedy, is the perennial *Campanula patula.* The thin stems, green-ridged and glossy, rise two to three feet and are much-branched; in my garden they require staking. The basal leaves are oblong-spatulate, while the stem leaves are lanceolate. The upper leaves on stalks are pointed at the tips, vary in length, and have wavy, irregularly toothed margins. The flowers of rose-violet are disposed in loose, much-spread panicles and measure one inch long and the same across. The tips of the petals are spreading and revolute. The flowers are charming under snow-white philadelphus which blooms at the same time. *C. patula* is widespread in the lowlands of Europe.

Along with other choice plants brought from my old home in Peekskill, New York, twelve years ago were plants

of *C. alliariaefolia,* a perennial species native to Russia and Turkey. These same plants are thriving in my present garden. *C. alliariaefolia* is so hairy that it feels soft and woolly to the touch. The nodding white flowers grow in a terminal panicle about a foot long and bloom the third week in June. There is a form tinged slightly tobacco-pink. The flowers are one inch long and borne on short stalks. Between each of the sepals there is a fold, as in *C. sarmatica* and *C. grossecki.* The sepals are pointed, and the petal-lobes hairy along the margins. The basal leaves are cordate and felty; the stem leaves cordate-ovate, growing shorter as they ascend. Both basal and stem leaves are hairy below, and almost smooth above. The plant reaches to about two and a half feet high and requires staking. This campanula is growing in a sunny border in my garden, but can be grown in partial shade as well.

A biennial campanula that is widespread in Europe and southwestern Asia is *Campanula cervicaria.* It is a hairy plant and grows to two and a half feet and sometimes higher. The pale violet-blue flowers, which form clusters in the axils of the leaves and a terminating cluster at the top, bloom in mid-June. The terminal cluster is two inches across. The leaves subtend this cluster and partially envelop it. The flowers are seven-eighths of an inch to two inches long, and five-eighths of an inch across. The pistil is exserted and has a blue style and a green stigma.

One day last summer, when there were many visitors, *C. glomerata* was in full bloom. It was the most conspicuous flower in my garden and greatly admired. No one knew it, and many asked where they could obtain plants. It reaches to two feet high with me. The stems are hairy, the hairs short and stiff. The stem leaves have no petioles and are two-thirds of an inch long; the basal leaves are usually insignificant. The flowers of rich purple are borne in whorls in the axils of long leaves and at the top of each stalk, where they form a tight little bouquet, measuring

Campanula latifolia macrantha.

Campanula glomerata.

two and one-quarter inches across. The individual sessile blossom is one inch long. The calyx is white at the base, and the sepals are tipped green, hairy, pointed, and linear. The corolla is tubular and flaring, the pointed petal lobes turn out gracefully, and the style looks like white velvet. In *Campanula glomerata* var. *acaulis* the stems are only seven inches or so high, and the clusters of flowers are so close that they appear to be crowded.

The largest—and to me, handsomest—of the tall perennial campanulas is *C. lactiflora.* In late June, when it blooms amid tall day-lilies and regal lilies, it reaches from three and one-half to six feet in height and stands upright except for a slight bending of the outermost branches. In one bed this campanula came up spontaneously beside a specimen of *Berberis rubrifolia,* and the pale lilac, openly campanulate blooms were set off perfectly by the wine-red stems and foliage of the shrub. The stems, as also the under surface of the leaves, are covered with hairs. The leaves are three and one-half inches long and one and one-quarter inches across, rounded and irregularly toothed. The flowers measure one and one-quarter inches across, are pale blue to white, and are borne in panicles. The long pointed petals open two-thirds of the way down, and the calyx-lobes, narrow and pointed, reach to one-third the length of the corolla. When the flowers are open, they have a velvety texture and the outside ribbing shows through. There is a white form, 'Captain Edward Molyneux', and there are other color forms.

Campanula medium.

When cut back, *C. lactiflora* will bloom on and off through the season. The first time I saw this handsome plant was in Ellen Wilmott's garden in England; her gardener gave me seeds, and I still have the descendants.

Campanula latifolia is a fairly coarse perennial plant, having a stalk four feet high and terminating in a flowering spike of seventeen inches or so, upon which large bell-shaped flowers grow thickly, each on a short pedicel. The corolla is three-fourths of an inch long and one and one-half inches across. But, alas, the flowers last only a week. There is a white form, *alba,* and a large-flowered one, *macrantha;* but in my opinion it is not worth while to give up space to a plant of such fleeting beauty.

Peach-leaved campanula or peachbells, *Campanula persicifolia,* native to Europe, Siberia, and southwestern Asia, can be grown in dry shade, a virtue possessed by few plants. At one time it seeded itself in my garden under a spruce, and again under an oak. However, it must be admitted that it flowers more fully and freely under conditions where the soil is free of tree roots. The plants are extraordinarily vigorous and floriferous and in time grow into wide mats. They can always be divided. The roots are shallow and the stems are as straight and stiff as a plumb line, about two to three feet high, and carry terminal open racemes of violet, light blue, or white blossoms which begin to appear in early June and continue into July. (The plants produce new flowers, if the old ones are removed.) The blossoms are bowl-shaped, one to two inches across, and occasionally double. The petal is shaped like a flattened-out ogival arch and measures one and one-half inches across. Var. *moerheimi* with white flowers and 'Telham Beauty' with dark flowers do not always come true when grown from seeds.

Campanula barbata, similar to *C. alliariaefolia,* is sixteen inches high. The narrow spatulate basal leaves have stalks and are two to five inches long, the stem leaves become smaller as they rise. The calyx looks as though it were double, because of the fold between the sepals. The flowers are exquisite in shape, like true flaring bells, with the pistil greenish white on the upper part and exserted. They measure one inch in length and one and a half inches across, and they grow singly on brownish stalks all on one side of the stem that curves downward. They are roseate violet and hairy within. The plant has behaved as a biennial in my garden, though Bailey says it is a perennial. *C. barbata* is native to Italy, Switzerland, Austria, and Czechoslovakia.

Of all the flowers I grow, *Campanula rotundifolia* is my favorite. It is dainty, exceedingly hardy, and self-sows over rocks and between and over other perennials, especially *Dianthus.* If it gets in the way, it can be dug up. Some plants now grow in the gravel at my entrance steps, others in the stone steps leading into the garden, all spontaneously and becomingly. *C. rotundifolia* is said to be essentially a boreal plant but grows southward in the mountains, notably in Scotland where it is called bluebell, also harebell. There are many variants. On tall varieties the stems are repandent to twenty inches long. Some plants repeat their bloom, continuing in flower almost all summer: some are pale in color, and there is a white-flowered form. The basal leaves are kidney-shaped, deeply cordate with toothed margins, one inch or less across and on slender stems. Often these leaves disappear later in the summer. The stem leaves are slender and curve downwards. The bell-shaped flowers, clustered at the termination of the stems, measure three-quarters of an inch long and across. The pistil stands up but is not exserted. When broken, the stems have a bitter smell.

Campanula cochlearifolia.

When I was a little girl, I spent a summer on Loch Katrine in Scotland with my parents and other members of the family, and we read *The Lady of the Lake* by Walter Scott. I was a stout child and never forgot the description of Ellen in Canto 1, and always hoped I could tread on these flowers without crushing them as she did.

"What though no rule of courtly grace
To measured mood had trained her pace
A foot more light, a step more true
N'er from heath-flower dashed the dew;
E'en the slight harebell raised its head
Elastic from her airy tread."

One of the handsomest of bellflowers is the medium-high *Campanula medium,* or Canterbury bell, native to southern and eastern Europe. I do not grow it, however, because, like the tall hybrid delphinium, it is too demanding. After the flowers fade, the plants are so unsightly that they must be removed and the space left vacant readied for a replacement.

The Canterbury bell has oblong bells of pink, white, and light or dark blue, swelling at the base and measuring two to two and one-half inches long. The plant has a stout taproot and grows twelve to thirty inches high. When forced under glass, it may reach six feet in height. The Canterbury bell carries its many large flowers on short pedicels or short branches. There are double-flowered forms, one called cup-and-saucer in which the calyx is enlarged and resembles the corolla, and varieties *alba, caerulea,* and *rosea.* Dr. Bailey says the double strain seldom comes true from seed.

The tussock bellflower, *Campanula carpatica,* native to the Carpathians, makes a perfect border plant for other perennials. It is about fourteen inches high. The stems are square, slightly recumbent, and much-branched. The leaves, larger at the base of the stem, are yellow-green with sinuate-dentate margins; they have tiny hairs on the upper surface and a few long ones on the under surface. One side of the leaf is larger than the other. The corolla is saucer-shaped, wide open in some forms, and always with the center of the petal terminating in a point like the arch of a Moorish building. The flowers may be violet in color, white, or a whitewashed blue. Sometimes they are five-eights of an inch across. Bailey gives many varietal names, and when one comes across them in the seed catalogues, they are worth trying. 'Isabel' bears violet-colored flowers in mid-July. 'Porcelain Blue' also blooms in mid-July; this is a spreading plant with stems a foot long, very similar to 'White Star' but of a deeper color. 'Riverslea' comes in to bloom in late June, the flowers a pale or deeper lavender and white. One year carpaticas were grown across the top of the Thompson Memorial Rock Garden at The New York Botanical Garden with stunning effect.

At times the rock-garden species make charming little clumps, again they may be straggly. They are difficult to grow; yet where they find a place that meets their requirements, they remain and flower for years.

There are six varieties of the Adria bellflower, *C. elatines,* and I think I have the variety *garganica.* The stems are recumbent, ascending at the tips, and are six to eight inches long; the basal leaves have a distinct acute apex, are cordate-ovate, unevenly dentate, and about one and one-half inches long and almost as broad. The blue-violet flowers are small, one or two together, on a slender pedicel with the style exserted; the corolla wide open, the petals curving back at the tips, and the base either white or pale lavender. The sepals are very narrow.

What was formerly *C. pusilla* is now *C. cochlearifolia.* The stem leaves are lanceolate; the basal leaves, ovate to nearly reniform, are bluntly toothed; the stems are recumbent, four to six inches long; the flowers are purplish blue, one-half to three-quarters of an inch long and nodding. This species is native to the mountains of Europe.

In early June, *Campanula caespitosa* opens its gray-blue flowers, some of them nodding. It, too, has somewhat recumbent stems, with broadly lanceolate leaves having two indentations on each side. The basal leaves are tufted and have a longish stalk. There are several flowers to a stem; they have thin sepals, white tinged all over with violet which gives them a gray look. As I looked through different herbarium specimens, I found the plant to be very variable.

There are ten or so native American campanulas, and they are difficult to find either as seeds or plants. Most of them come from the Pacific Coast and from high in the Rocky Mountains, so they are not for my neighborhood. *Campanula parryi* grows eight inches high or more and has terminally disposed flowers, one-half inch long. From a running root comes small tufts of strap-shaped leaves. The large lavender-blue flowers, either singly or in clusters of two to three, rise from pedicels in the axils of the leaves. The corolla is shallowly campanulate and lobed nearly half its length. The blue style is not exserted. The calyx is entire and not reflexed, about half the length of the corolla.

Campanula piperi, to be found in Oregon and Washington, is probably a form of *C. rotundifolia.* The flowers are bright blue, small, upright, and have a colorful style and stigma. The basal leaves are deeply notched and wide above the center.

The native campanula that does thrive for me is *C. divaricata.* It is widespread, having been found from Pennsylvania, Kentucky, Tennessee, and West Virginia to Georgia. The plant is wiry, to three feet high, with branches

Campanula elatines garganica.

extending stiffly from the central stem. The basal leaves are generally absent, when the flowers are mature. The flowers are tiny, dainty, and profuse, about half an inch long, and characterized by a prominently exserted style and stigma. *C. divaricata* has a sparse look but comes up on time every year out of an exposed rocky situation. It blooms late.

JAPANESE FRUITS (Continued from page 95)

In the making of *miso* and *shoyu,* the soybean protein is partially digested by the action of *koji* mold. *Miso* is a thick paste which may be white, dark brown, or light brown in color. White *miso* is sweet and less salty than the dark *miso,* and it is made with a mutant mold having white spores instead of the normal green spores. *Miso* is used chiefly in the preparation of *misoshiru,* a *miso* soup which is a favorite breakfast food. It is also used in sauces and for seasoning.

Shoyu, soy sauce, is used for seasoning vegetables and fish. *Shoyu* is very salty. In a climate as humid as that of Japan, salt shakers are impractical, and a salt solution, such as *shoyu,* is the ideal way to salt food.

A fermented preparation of whole beans, in which a bacterium rather than a mold is the agent of fermentation, is known as *natto. Natto* is the only food spoken of in this article that I failed to taste while in Japan.

(To be Continued)

BASIL STORY (Continued from page 88)

CHECKLIST OF BASILS

Genus *Ocinum* Family *Labiatae*

CULINARY

green leaf, white flower:
sweet basil *(O. basilicum)*, three feet
curly-leaf *(O. crispum)*, two and a half feet
lettuce-leaf *(O. crispum* var.), eighteen inches
Italian (form of *O. basilicum)*, two feet
lemon *(*form of *O. basilicum)*, two feet
bush **(O. minimum)*, one foot
dwarf **(O. minimum* var.), one foot
*(Bush and dwarf basils differ in the width of their leaves and the length of their flower sprays.)

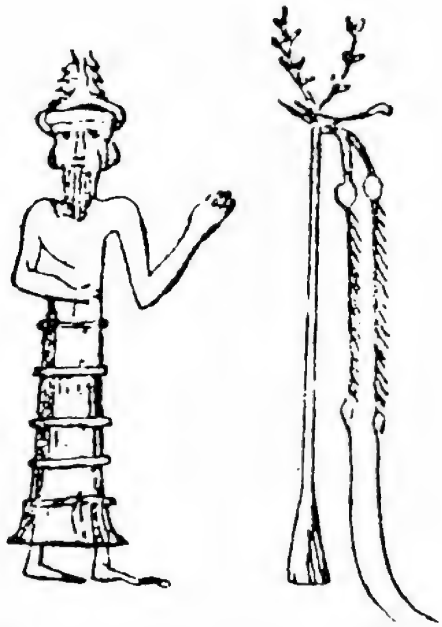
purple leaf, pink flowers:
sweet purple basil *(O. basilicum purpureum)*, two feet
curly-leaf purple *(O. basilicum purpureum crispum)*, two feet
bush purple *(O. basilicum purpureum minimum)*, eighteen inches
dwarf purple *(*form of *O. basilicum purpureum minimum)*, one foot

ORNAMENTAL

green leaf, lavender flower:
giant African basil *(O. kilimandschuricum)*, three and a half feet
holy basil of India *(O. sanctum)*, eighteen inches

purple leaf, lavender flower:
'Dark Opal', eighteen inches

purple leaf, pink flower:
'Plantation Cluster', eighteen inches



A Chaldean cylinder, about 3,000 B. C., probably the earliest illustration of the Maypole—a staff placed on a support and crowned by two branches, with two long plaited strings hanging from the fork of the branches.

MAYFLOWERS (Continued from page 86)

the colors of the Virgin, and the first communion is solemnized. It is deemed unlucky to marry during this month. As the rose is dedicated to the Virgin, it is known as the Mayflower in Italy; but many of the people regard the violet as the Mayflower and wear bouquets of this beautiful flower on May Day. A doll, which is dressed in pure white, is carried in a basket of flowers and garlands in processions to symbolize the Madonna in Italy, in sections of Ireland, and in other lands.

Common Mayflowers in Germany are the dandelion, azalea, speedwell, and kingscup or *Ranunculus bulbosus.*

The revival of vegetation is celebrated in the highlands of Scotland on the first day of February; in some parts of Sweden, this festival takes place on the first Monday after the spring equinox.

"A Maid who on the first of May,
Goes to the fields at the break of day,
And washes in dew from the Hawthorn tree,
Will ever after handsome be."

ROSE DAY AT THE GARDEN

Plans are well under way for the Twentieth Annual Rose Day at The New York Botanical Garden. The tentative program includes a talk, at 10:30 a.m., on "Roses in the Home Garden" by Paul Frese, well-known horticulturist, lecturer, and writer. Time will be allowed between 11:30 a.m. and 2 p.m. to visit the rose garden and to have lunch at the Snuff Mill. Thereafter, the film "A Rose For You" will be shown. T. H. Everett, Assistant Director (Horticulture) and Senior Curator of Education, will moderate the "Rose Clinic" from 2:20 p.m. to 3:30 p.m. Mr. Everett will be assisted by a panel of experts.

ROSES OF THE PAST

By HERMAN F. BECKER

Dr. Becker is Research Associate of The New York Botanical Garden and, under a grant from the National Science Foundation, is continuing his research on the Tertiary Ruby Flora of southwestern Montana.

OF THE ROSE many a poem was written, many lyrical words were uttered with feeling; many silent glances were understood to the accompaniment of a bouquet of two-toned 'Satan', fiery 'Mephisto', or pure white 'Innocence', depending on intent. 'American Beauty' became a byword. The wild rose was chosen as the flower of New York State. The rose is truly international, universally loved, and its beauty and fragrance have inspired and intoxicated mankind since the dawn of civilization.

Where does the rose come from, when, and how? Who venerates its ancestry, extols its genealogy? In search of an answer for the origin of plants, paleobotanists grope in the shadows of the unknown, in the dim past. They emerge with the word "evolution," a concept that evokes elation and suspicion alike, a concept that only now begins to be cleansed of its sinister meaning. Cryptically, evolution is "descent with modification," the ability to survive, progress, disperse, and transmit ever expanding variations to the offspring. Man, in a sense, has become the master of his environment; but in his nakedness he would be, in nature, one of the most helpless creatures, biologically ill-equipped to cope with a primeval state. Man's greatest biological endowment is his brain, his most versatile tools are his hands. With this combination he has devised methods of protection and aggression, of construction and destruction, of culture and inanity. He first used clubs, stones, and arrows to kill animals for food and clothing; then he developed armor for protection; and in this age of science he has conceived ways of traveling faster than sound, of shooting and talking around the world, of reaching the moon today and perhaps the planets tomorrow. In short, he has acquired all traits with which the animals below him are equipped and has improved upon them far beyond his biological potentialities. In bypassing his biological short-comings through thought, man has gained victory over the entire organic world.

Similarly, but in a less dramatic way, plants have "evolved" and adapted themselves to the ever changing conditions on this globe. "Nothing is constant but change" is a truism which holds the key to our varied flora, and thus also the key to the ancestry of our roses.

In the closing statement of Charles E. Resser's *Very Ancient Roses,* he dares to be sure of one thing: "When man arrived on this earth there was the beauty and the fragrance of the rose to make his home more enjoyable." In essence this may be true. Sometimes, however, with our usual anthropomorphic projection of sentiment, wishful thinking supplants unproven events. It is difficult to visualize a Neanderthaler planting rose bushes or arranging their flowers to make his home (cave?) more enjoyable—and this attractive human specimen was preceded by a score of even more primitive men, back to about a million years ago. Possibly I am mistaken. Man may have evolved phenomenally since the ice ages because he was bedded in roses. In many places in Europe, Asia, and America he may have been surrounded by roses, among other vegetation; eaten rose hips (I doubt he made rose jelly or parfum à la Rivière); and may even have enjoyed their color and fragrance. Consciousness of surroundings and recognition, by trial and error, of edible and otherwise useful plants certainly had their beginnings in prehistory. The Neanderthaler with a club, dragging his woman into a rose-bedecked cave, is a far cry from today's milady at The Ritz presented with a dozen "American Beauties" by her cave man artfully disguised. Evolution certainly has come of age!

Multiply the span of civilization (six thousand years?) by five thousand, and we arrive at the relatively young geological age of the Oligocene epoch, about thirty to thirty-five million years in the past. It is from this age, and even somewhat earlier, that our first authentic record of roses exists. In order to appreciate and comprehend the immensity of this "short" geologic time, we must delve into the intricacies of unraveling the history of the earth, especially mountain building (uplift), erosion of land to the lowest possible level (peneplanation), and the physical mechanism responsible for crustal unrest. If, somehow, we could telescope days into millenia, we would be transposed to a surface that rocked and swayed like ships on a restless sea. Such are the subtle forces of crustal movement on the earth. Through measurements of radioactive decay in elements that make up rock, we arrive at the conservative age of two billion years (up to eight billion years are sometimes suggested) for the earth and, according to an accepted margin of error, generously give or take a few millions. Who would quibble about one drop more or less in a bucket of water? As we ascend from the eons of time through the middle and recent ages of geologic history, our tools become sharpened, more sensitive, and our generosity diminishes in proportion. With the advent of radiocarbon-14–dating to determine the age of organic remains, our "give-and-take," termed "plus and minus," is effectively reduced to from fifty to two hundred years. This method, however, because of the short half-life of Carbon-14 (5580 $\pm$ 45 years) is accurate only up to thirty thousand years. It is especially useful in archaeology and in late Pleistocene to Recent bog and pollen studies, but insufficient for dating self-respecting fossil roses or other plants associated with them.

Fossil roses, once considered very rare, have entered the stage of normal distribution as evidenced by their occurrence in a score of localities in the western United States as well as in Europe and Asia. They are usually associated with a temperate flora comparable to a modern plant community. Few fossil rose species have stood the test of time by weathering the scrutiny of "lumping" taxonomists. A brief history will illustrate this point. In 1883 Leo Lesque-

TABLE 1
DESCRIBED SPECIES OF FOSSIL ROSA

Rosa species	Author	Year	Geological Epoch	Area	Suggested relationship of group combinations *alvordensis*	*shanwan-gensis*	*legányii*	*hilliae*
R. akashiensis	Miki	1937	Pliocene	Japan	X			X?
R. bohemica	Engelhardt	1885	Miocene (Olig.)	Bohemia				X
R. alvordensis	Axelrod	1944	Pliocene	Oregon	X			X?
R. cetera	Hollick	1936	Paleo-Eocene	Alaska				X
R. confirmata	Hollick	1936	Paleo-Eocene	Alaska				X
R. harneyana	Chaney and Axelrod	1959	Miocene	Oregon				X?
R. hilliae	Lesquereux	1883	Oligocene	Colorado				X
R. inquirenda	Knowlton	1916	Oligocene	Colorado	calyx			
R. legányii	Andreánszky	1959	Oligocene	Hungary			X?	X?
R. lignitum	Heer	1869	Miocene (Olig.)	Baltic				X
R. miocenica	Axelrod	1939	Miocene	California				X
R. ruskiniana	Cockerell	1908	Oligocene	Colorado	bud			
R. scudderi	Knowlton	1916	Oligocene	Colorado				X
R. shanwangensis	Chaney and Hu	1940	Miocene	Eastern China		X		
R. usuyensis	Tanai	1961	Miocene	Japan	X			X?
R. wilmattae	Cockerell	1908	Oligocene	Colorado				X
R. sp. *bánhorváti*	Andreánszky	1959	Oligocene	Hungary			X?	X?

reux of the United States Geological Survey described and named the first fossil rose from the Oligocene Florissant beds in Colorado. It is much to the credit of this pioneer paleobotanist that his *Rosa hilliae* was only recently (by MacGinitie in his work on the fossil flora of Florissant Colorado, 1953) made a form species* for the majority of described fossil roses. The accompanying table elucidates the vagaries of the taxonomic mind, but its implication also suggests a ray of hope for nomenclatural procedure.

In sifting pertinent remarks by our fossil-rose authors the following combinations, based on significant morphological similarities within the species, may be presented. The youngest group of Mio-Pliocene age, represented by *R. akashiensis, R. usuyensis,* and especially *R. alvordensis,* are admittedly poorly distinguishable from *R. hilliae,* differing mainly in smaller leaflets as an ecological factor. *R. alvordensis* is separated only on the basis of a drier habitat where other species may not have survived. *R. hilliae,* for the Oligocene and Miocene epochs, contains the Miocene *R. miocenica, R. harneyana,* the Oligocene *R. inquirenda, R. scudderi,* and *R. wilmattae.* In addition, Hollick's *R. cetera* and *R. confirmata* (almost indistinguishable from each other) appear to push the fossil-rose record back into the Paleo-Eocene, extending the age range to over fifty million years. Arthur Hollick, formerly of The New York Botanical Garden, anticipated the relationship of his Alaskan material with the form species when he stated that *R. confirmata* might well belong to the *hilliae* group, excepting the slightly more rounded base of the leaflets, their larger size, and their varying number on a leaf, characters which may be found on a single plant. Regarding *R. cetera,* Hollick points out that this specimen may be a lateral leaflet of *R. confirmata.* Furthermore, he suggests that *R. lignitum* and *R. bohemica* resemble his Alaskan species, and this, to me, closes the ring. The table of described *Rosa* therefore shows that all seventeen species may essentially be reduced to four forms with those from Hungary of doubtful specificity and very similar to *R. hilliae.* This leaves essentially one distinct species from China and our own western form species.

Technically speaking, the fossil roses need revision, if it can be done; but revision will be far more difficult than attempting to separate living roses into species on the basis of leaflets alone.

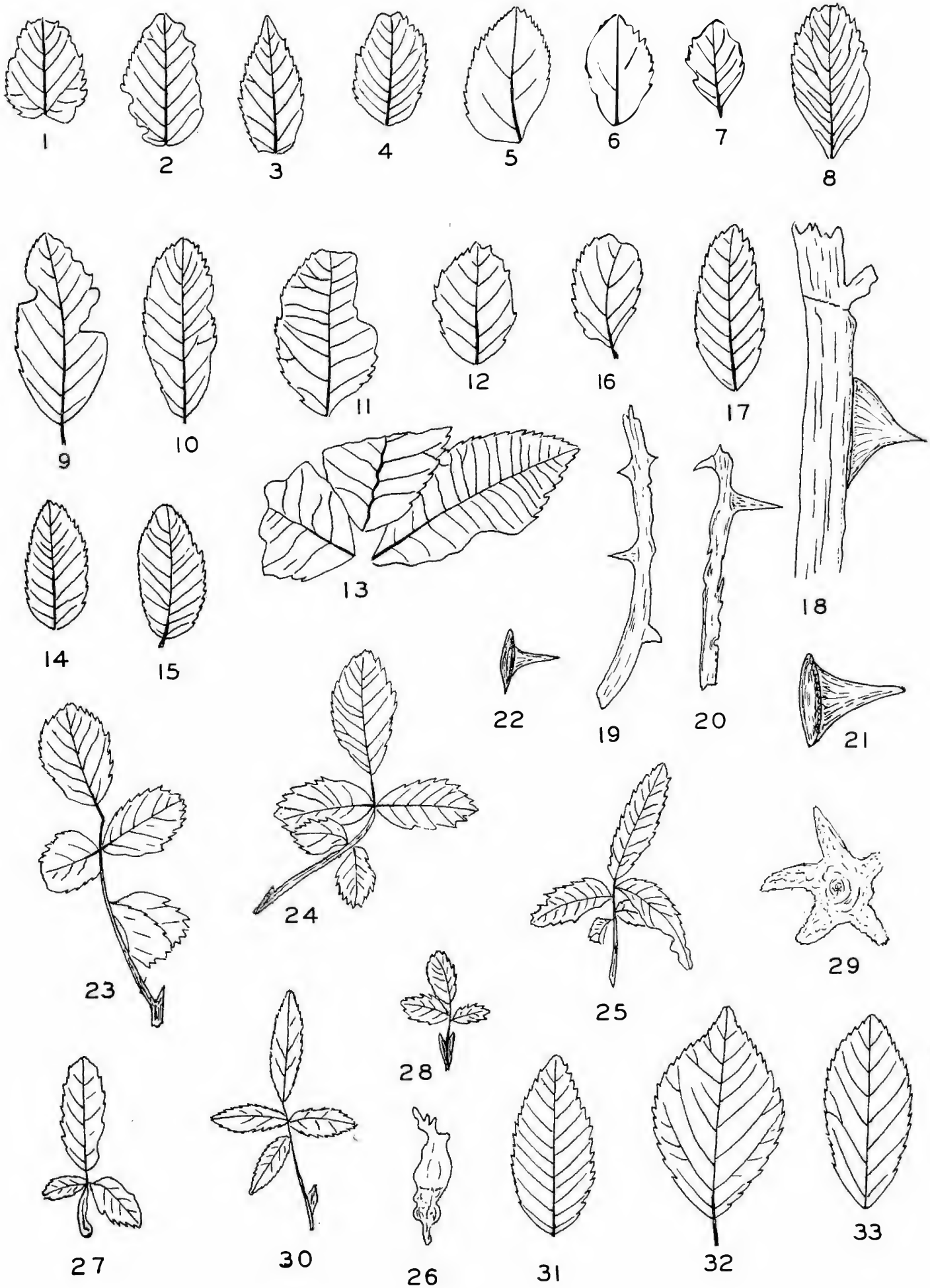
Harry D. MacGinitie, commenting on his *Rosa hilliae* synonymies, states: "Combining the above nominal species is, in a sense, arbitrary, but it is the only course to follow unless we are to give each fossil specimen of *Rosa* a different specific name." In the light of an enormous variation in size, shape, and dentation of living leaflets, such reasoning seems fully justified. Modern rose species are differentiated primarily by their floral structures, which do not exist in the fossil state. Their close specific relationship is demonstrated by the ease with which they hybridize, pointing to undifferentiated common ancestors and a continuance of genetic compatibility. In living species, therefore, if genetically they really *are* species, a random collection of leaves will actually defy identification. Variable fossil leaves or leaflets are thus rightfully united in the form species *Rosa hilliae* Lesquereux. Analogous leaflets are found in the living *Rosa nutkana* Presl, *R. setigera* Michaux, *R. cherokeensis* Donn, and the most similar, *R. palustris* Marsh, common in moist habitats of eastern and central North America. Fossil-rose leaves occur with three, five, or seven leaflets and minute petiolar thorns and stipules, characteristics identical with those in living roses.

What are some of the reasons for the survival and suc-

(Continued on page 114)

*Fossil plants whose genus is recognized (viz. Rosa) but whose specific characteristics are poorly refined.

Specific names are those originally designated. Combinations are not taken into consideration. Figures 31-33 are for comparison with the fossils. 1-3, *Rosa shanwangensis* Chaney and Hu; *R. alvordensis* Axelrod; 5, 6, *R. usuyensis* Tanai; 7, R. *miocenica* Axelrod; 8, *R. harneyana,* Chaney and Axelrod; 9, *R. cetera* Hollick; 10, *R. confirmata* Hollick; 11, *R. legányii* Andreánszky; 12, *R. bánhorváti* Andreánszky; 10, 20, *R. hilliae* Lesquereux; 21, *Rosa* sp.?; 22, 23, *R. hilliae* Lesquereux; 24, *R. wilmattae* Cockerell; 25, *R. hilliae* Lesquereux; 26, *R. ruskiniana* Cockerell; 27, 28, *R. hilliae* Lesquereux; 29, *R. inquirenda* Knowlton; 30, *R. scudderi* Knowlton; 31, *R. nutkana* Presl (living); 32, *R. setigera* Michaux (living); and 33, *R. palustris* Marsh (living).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The new building of the National Botanic Gardens, Lucknow, India, containing laboratories, herbarium, museum, and library.

THE UTILITY OF BOTANICAL GARDENS IN THE MODERN WORLD

By K. N. Kaul

Professor Kaul is the Director of the National Botanic Gardens, Lucknow (India). He presented a paper on the above subject at the symposium on "Tropical Botanic Gardens," held during the Tenth Pacific Science Congress at the University of Hawaii, Honolulu, August 21-September 6, 1961. The Congress was sponsored by the National Academy of Sciences, Bernice Pauahi Bishop Museum, and the University of Hawaii.

Some time ago a question arose in India as to what should be the functions of a botanical garden. The author circulated a request to the directors of the well-established, world-renowned botanical gardens for their views. The following is a summary of the main lines of work that they suggested.

A botanical garden should be an educational institution for scientific workers and lay public. It should awaken interest in plant life and help us to come closer to an understanding of the sources of our own existence.

It should be an institution for botanical research, particularly on the native flora of the region in which it is located, with a qualified botanical staff.

It should introduce and naturalize well-known economic plants and plants of special interest.

It should display plants of certain geographic formations, such as desert plants, alpine plants, marshy plants, aquatic plants.

It should display weeds, and methods for their control, and should demonstrate the use of weeds and other common plants for economic purposes.

It should display collections of different varieties of cultivated plants, especially of ornamental plants, and ideas useful in organizing various gardens, such as spring border, summer border, fall border, annual flower border, continuously blooming border, planting for shady places, planting of drought-resistant plants; and individual gardens of irises, phlox, peonies, dahlias, poppies, cannas, lilies, astilbe, primulas, violas, and ferns. It has also been suggested that orchids, gentians, and grasses can be displayed as individual gardens.

It should display plants mentioned in classical and religious literature; state flowers, national flowers, and favorite flowers of the locality.

A botanical garden should have a medicinal plant garden; a morphological or biological garden, in which to display seed dispersal and physiological processes in plants; a genetics or breeding garden in which to display the laws of heredity and horticultural hybrids; a taxonomic (or systematic) garden in which to display plant families.

There should be an arboretum, a fruticetum, a section devoted to economic plants; greenhouses for propagating and cultivating plants; conservatories or show houses for display; nurseries, and so forth.

There should be an herbarium, library, art and photographic studios, lecture pavilion, and recreational facilities.

If we accept all the views of the specialists, as summarized above, the utility of botanical gardens in the modern world is fully established, since all the fundamental and applied aspects of botany come within the purview of the botanical garden, and it becomes the center of horticultural, agricultural, and silvicultural activities, besides being the center of cultural activities of the region in which it is located.

If we trace the history of the development of the botanical gardens of the world, we find that these gardens in the West started as centers of cultural activities. Later workers specialized in different directions and created institutions

moulded to their special interests. The earliest botanical garden of the West seems to have been organized by Aristotle in 350 B.C. He was a Greek philosopher, logician, mathematician, astronomer, metaphysician, and biologist. He was, in fact, a personality in which all the sciences of his age combined.

In India, if the systematic cultivation of medicinal plants and plants of economic importance in gardens can be considered as a botanical activity, as has been done in the West, it can be shown that botanical gardens existed at a very early date.

In the edict of King Ashoka (220 B.C.), inscribed on a rock in Pali language at the foot of the Girnar Hill in Junagarh, Gujarat State, we find the following.

"Everywhere in the dominions of King Priyadarshi (Ashoka), Beloved of the Gods, and likewise in the bordering territories such as those of the Chodas [Cholas] and Pandyas as well as of the Satyaputra and the Keralaputra [Kerala] as far south as Tamraparni [Ceylon] and in the territories of the Yavana [Greek] King Antiyoka [Antiochus, one of Alexander's generals and a king in Asia Minor after the death of Alexander] and also the kings who are the neighbors of the said Antiyoka—everywhere King Priyadarshi, Beloved of the Gods, has arranged for two kinds of medical treatment, namely, medical treatment for human beings, and medical treatment for animals. And, wherever there were no medicinal herbs beneficial to human beings and animals, everywhere they have been caused to be imported and planted. Wherever there were no roots and fruits, everywhere they have been caused to be imported and planted. On the roads, wells have been caused to be dug and trees have been caused to be planted for the enjoyment of animals and human beings."

There is another earlier reference to a great Indian physician, who made an intensive survey of the medicinal plants of India on the suggestion of his preceptor. This famous physician, known as Jivaka Komarabhacca, flourished during the reign of King Bimbisara of Magadh [modern Bihar] from 546 to 494 B.C.

These are two striking references, by undoubted authorities on early Indian history, to the study of Indian medicinal plants and their cultivation. Attempts to search earlier records lead us to legends and mythology. One such legend seems to have some value and is worth considering here. This has been recorded by a Greek Ambassador, Megasthenes, who visited India in 300 B.C. and left a history of India full of very useful observations. According to him, "The men of greatest learning among the Indians tell certain legends of which it may be proper to give a brief summary. They relate that in the most primitive times, when the people of the country were still living in villages, Dionysos made his appearance coming from the regions lying to the west and at the head of a considerable army. He overran the whole of India." ". . Having after this turned his attention to the artificial propagation of useful plants, he communicated the secret to the Indians and taught them the way to make wine, as well as other arts conducive to human well-being. He was, besides, the founder of large cities, which he formed by removing the villages to convenient sites, while he also showed the people how to worship the deity, and introduced laws and courts of justice. Having thus achieved altogether many great and noble works he was regarded as a deity and gained immortal honours." Who was Dionysos or Bacchus? According to Megasthenes, Father Bacchus was the first who invaded India. From him to Alexander the Great, 6,451 years are reckoned with three months additional, the calculations being made by counting the kings who reigned in the intermediate periods, to the number of one hundred and fifty-three.

These early Indian traditions preserved in Greek literature have their counterpart in the Sanskrit literature of India, where the deified Dionysos or Bacchus is replaced by a great Yogi who gave arts and sciences to his devotees. He is known as Siva. His followers carry a trident, as did the followers of Dionysos or Bacchus, and worship a round elongated stone, called lingam in Sanskrit, like the phallus.

According to Indian tradition, Lord Siva and his disciples laid the foundation of a large number of cities in India. Many of them exist today and are places of pilgrimage, Banaras being one of them. His disciples roam about India as Vairagis or monks and are revered as repositories of ancient knowledge, especially of herbs and medicinal plants. They generally stay near towns on the banks of rivers in small hermitages, where they plant vegetation for utility and beauty. These gardens have been in existence throughout India for thousands of years and have been repeatedly mentioned in ancient Sanskrit literature. They functioned as the botanical gardens of the Old World.

Thus the botanical gardens in the West and in the East appeared with the growth of human culture. They were essentially utilitarian and functioned as the center of human progress. They, in fact, reflected the growth of human culture of the regions in which they were situated. Today, also, the botanical gardens reflect the glory of a nation or of a country. It is very significant in Indian history, which runs through thousands of years, that these gardens have flourished with the rise of different dynasties and dwindled away with their fall. In the modern period, during the progress of Mughals, East India Company, and the British, botanical gardens also prospered; and with their fall botanical gardens decayed. Now with India's independence, they are again coming up like mushrooms. Efforts are being made to organize small centers of cultivation of useful plants for their study and use. Government and private organizations are giving attention to this aspect of social life, and it is hoped that very soon a network of botanical gardens will start functioning to revive an intensive botanical activity. It is therefore essential that the well-trained workers in the field take the initiative in directing the energy released during the social, political, and economic upheaval of the East after the cessation of the Second World War and organize botanical gardens.

The modern world faces many problems. Our population is increasing at a remarkable rate. The food supply here in the East is not enough to keep the people in a healthy state. Fertile areas are limited. Forests are being cut down to meet agricultural demands. More lands are being cultivated. Deserts are encroaching here and there, and in the arid zones saline and alkaline formations are increasing. Only a botanist with a synthetic approach can tackle such prob-

(Continued on page 113)

NEW ZEALAND REVISITED

By PIERRE DANSEREAU

Dr. Dansereau is Assistant Director (Botany) and Senior Curator of The New York Botanical Garden.

Continued from the March-April, 1962 issue

IV. FIORDLAND AND MOUNT COOK

610502.—DUNEDIN—GORE—TE ANAU —CASCADE CREEK

A lovely day as we leave, Geoff Baylis, Françoise, and I, and lovely all day, balmy autumn light on the land. From Dunedin to Gore the yellow hills of Otago with their sheep, the green patches of "exotic pasture." (An odd expression since the exotic grasses, mostly *Lolium perenne* or its hybrids, are said to come from "home"!) Sheep are also let loose in turnip fields, dark green and dull brown. We wind in and out of one prosperous and rather ugly town after the other. Tea-rooms, garages, markets. Here and there we come somewhat close to undomesticated or wild vegetation. Originally the Taieri Valley must have been silver tussock *(Poa caespitosa)* and/or red tussock *(Danthonia rubra)*. But now we are never very far away from a degraded tussockland, often running to browntop *(Agrostis tenuis)*. Gorse and broom in small quantities, almost no manuka. Near Clinton, some remnants of very black podocarp forests in the gullies and red tussock on the hills. At Pukerau a beautiful pure stand of the latter on what looks for all the world like a raised bog. It is unquestionably peat several feet deep as shown in the ditch. The *Danthonia rubra* rises red and glistening more than 150 cm. and *Hypolaena lateriflora* forms a bristling green-and-yellow carpet beneath. Geoff hopes that this can be set up as a preserve.

Here as in the rest of Central Otago (see Alexandra and Bendigo) it is hard to imagine what the original riparian zonation was. Geoff says Cockayne recorded *Myriophyllum-Potamogeton-Carex secta-Typha-Phormium-Leptospermum* and *Coprosma* (small-leaved: *propinqua? pseudocuneata?*) *–Podocarpus dacrydioides.* Nothing like that here: *Salix fragilis* à perte de vue on all uncultivated alluvial strands.

Déjeuner sur l'herbe at Gore, with the flowering gorse and the incurious sheep. And on to Lumsden and Mossburn. Landscape rather more homogeneous: hills pushed way back, dotted with rank-looking gray tussock. Flat, green plain with sheep. Black screens of Monterey pine, not all oriented similarly. A very set pattern of pasture-pine-gorse hedge (nicely pruned).

From Mossburn to The Key rougher landscape, more hilly, less uniform. *Leptospermum* scrub dying under attack by *Eriococcus.* The matagauri *(Discaria)* is like a black gauze on stony cliffs overhanging marshes with giant rosettes of crowded flax. It would seem (according to Geoff) that the mountain beech, which we see dimly on the hills, is invading the tussockland. Progress of beech very slow. (Like that of oak in the southern Michigan savanas?)

The light is somewhat slanting when we come to "The Wilderness," a surprising formation of regularly spaced olive-green domes of *Dacrydium bidwillii.* I remember this sight from 1949, but we had not stopped then. Now we wander through the scrubland with its islands of rather dense bushes of several individuals (vegetatively propagated like *Populus tremuloides* in the Saskatchewan "aspen parkland"?). Relevé here can be graded as to sylvatic, subalpine, and "desert" spp.?

Through rather barren gorges, with occasional stands of red tussock, to Te Anau, a kodachrome-blue lake with white wind furrows on its surface. We drive on to the north. Many miles of bracken. This New Zealand bracken is very green, evergreen, stiff *(Pteridium esculentum* or *P. aquilinum* ssp. *esculentum?)* The manuka that emerges very uneven, often blighted; in fact, few stands of healthy growth.* Many cabbage trees. Ten miles out: Te Anau Bush, a very good forest of almost pure *Nothofagus cliffortioides* (here the rainfall still quite low) reproducing very abundantly. And then more scrub. And from there on,

*The ecological and land-use problems posed by the manuka blight are very far-reaching and have been studied by J. M. Hoy (Scale insects associated with manuka species in New Zealand. N.Z. Journ. Agric., Dec. 1954, 3 pp.; and **Eriococcus orariensis** Hoy and other **Coccoidea** (**Homoptera**) associated with **Leptospermum** Forst. species in New Zealand. D.S.I.R. Bull. 141, 70 pp. 1961.)

Prof. G. S. T. Baylis's Victorian mansion in Dunedin.

Prof. Baylis in a raised bog of red tussock *(Danthonia rubra)* at Pukerau.

alternating forest and large flats covered with blond tussock *(Festuca novae-zealandiae)*. The lake very dark blue and the mountains rising sheerly dark blue-green clothed in a beech forest which tears at the top in a jagged edge, where the reddish snow tussock and *Dracophyllum* take over. And they in turn replaced by paler alpine streaks of rock and snow which fuse into the pale blue sky.

It is nearly dark when we arrive at Cascades. Do I remember these shacks? Did the Murphys and I sleep here? A row of cabins (1934-style of Gaspé), wood, with an outside tin chimney. A door, two beds (two narrow cots), nothing else. It is prohibited to light a fire in the grate. Mr. Burnby, the patron, a genial type, but anti-alcoholic, so we imbibe our whiskey "en catamini" to warm up.

610503.—CASCADE CREEK—KEY SUMMIT

Last evening's meal was not too bad, and the short evening by the fire not too chilly. Two couples of honeymooners with us at the table and in the "lounge." Quite talkative. They retire early (to those incredibly narrow cots!). One young man comes back to the lounge with his electric razor. But what a night in those two damp, cold cots.

Today Geoff and I walked up the Key Summit Trail that winds on the mountain side from the road level up to more than three thousand feet. Where the forest has been disturbed, or where a ridge sticks out, the relatively heliophilous *Fuchsia excorticata* prevails. The more regular topography, even where fairly steep, harbours beech forests, almost exclusively *Nothofagus menziesii.* From a large tree (100′) at the foot of the trail it dwindles eventually to shrub-size higher up. Actually much subalpine scrub way below climatic timberline, for avalanches are constantly rubbing out great expanses of forest and the *Phyllocladus alpinus* or *Senecio bennettii* and *Olearia avicenniaefolia* scrub take over. In the ravines, avalanche pathways, or stream edges, polished boulders all red with *Tentepohlia,* which can be seen at great distances. Some of the disturbances seem rather recent. What is the rate of establishment and growth of this alga?

In a young *Dracophyllum-Cassinia-Phormium colensoi* scrub, many apparent intermediates between *Dracophyllum longifolium* (lowland), *D. uniflorum* (subalpine), *D. prostratum* (alpine), *D. politum* (alpine-subalpine). Mass collection: we shall see later.

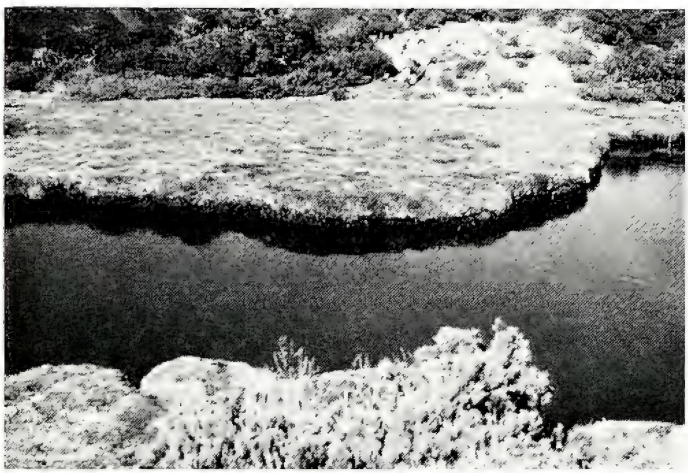
The bogland at the top quite remarkable. A large saddle with a few truly flat areas occupied by ponds of various dimensions (not much exceeding 6 meters maximum width) and surrounded by very tight cushion-mats that effectively block drainage, but sloping off in one or in two directions under a blanket of green and yellow bristling *Hypolaena lateriflora.* We spend several hours here, collecting, photographing, and making notes. The individual cushions are small and regular but somewhat diffuse, no beautiful tight medallions like on Maungatua. The gaimardias are especially curious. They and the *Oreobolus* propagate vegetatively and leave no interstices for other plants. A *Riccardia,* however, forms a dense green cobweb all over one of the gaimardias. Sphagnum not very abundant, rather localized. It is the vascular plants that form the bulk of the bog mass. Nor is the organic growth very deep. It seems to overlie the rock rather thinly in places. Rocky outcrops have a spare growth of moss (the ubiquitous

Just below Key Summit at about twenty-seven hundred feet. Second-growth scrub of *Cassinia fulvida* and several *Dracophyllum* species. In the middle ground, silver beech *(Nothofagus menziesii)* low forest. In the background, alpine zone of Mt. Christina.

Key Summit (about three thousand feet): bogland contained in rocky basin and showing ponds encased in peat bogs bordered by a scrub of silver beech *(Nothofagus menziesii)* and pink pine *(Dacrydium biforme).*

Rhacomitrium lanuginosum var. *pruinosum* dominant) and *Cyathodes empetrifolia* (so very like our *Empetrum!*) together with some tufts of *Poa colensoi.* But the most lovely feature is the *Dacrydium biforme* islands of low domed scrub, a bright olive-green sometimes pierced by the darker green of a straggling silver beech. This scrub is very complex in structure and contains good sylvatic species such as *Hymenophyllum multifidum!* Call this alpine? Moderate alpine indeed where filmy ferns are perfectly at home. (How much frost gets into this privileged biotope, so constantly humid and so nicely shaded?)

At 2,850 feet, through an ultimate beech forest (yes, *forest:* it *is* 10 meters high, a tree need only be more than 8*). Tops of trees staghorned, damaged by frost. Moss carpet quite moist, overwhelming quantity of epiphytes on trees. Very subalpine structure. (But floristically?)



Pond bordered by bog mat of *Sphagnum, Hypolaena lateriflora, Gaimardia* spp., *Oreobolus* spp., etc. In the background, honeymooners snuggled against rock, and beech-pine scrub *(Nothofagus menziesii, Dacrydium biforme).*

We end up at a station for *Dracophyllum menziesii* (the pineapple-tree), a most attractive species with bromeliad colouring. Then we turn back. The light is changing over the peaks. They have been ice-cream-pink all day, and now they are lined with scarlet, soon to turn an icy blue. Long streamers of mist rise from the now marine-blue valley. Drift along the contour lines quite horizontal, in our noses and out of our ears. Then all is clear again. The little bog lakes like steel mirrors encased in brown-green velvet. We are now somewhat weary as we plunge back down into the darkening forest, wet and cold and inhaling mushroom odors. I can only caress the perfect leaves of the tree-daisies as I go by and steer clear of the prickly dragon-trees. The lovely twisted trunks of the fuchsia are shedding their orange and lavender bark, and now, as we near the road, the tree ferns reappear with their lacy crowns no longer fringed in light but darkly denticulate against the livid sky.

610504.—CASCADE CREEK—HOLLYFORD VALLEY —MILFORD SOUND

No rainforest without rain. And so starts our day, shivering under our green oilskins. Phil Dorizac, forest ranger, joins us and leads. Beyond lakes striated with gray rain, through thick forest lined with large tree ferns. On foot down the Hollyford Valley Track. Precarious foothold in the pink mud and rolling gravel. Rata trees*(Metrosideros umbellata)* starting as epiphytes thirty feet up on a *Weinmannia.* Ferns and more ferns: the robust trunks of the *Dicksonia* with its lustrous coriaceous giant fronds; the straw apron of *Cyathea smithii* under its more delicate crown; the furry green of the arching *Leptopteris superba;* the transluscent heart (even in this light) of *Cardiomanes;* the tough round green pinnae of *Blechnum fluviatile;* the perfect symmetry (green lined with silver) of *Blechnum discolor;* and others, yet others. Each one deserving that its every veinlet be etched in the memory. Also the giant moss, *Dawsonia,* rising like a miniature many-storied tree out of other mosses; the tender silver of the lichens *(Stereocaulon* and *Sphaerophorus).* It is a long walk, up and down through this greenery—all green leaves and brown trunks and no vivid flowers at all. (Flowers in New Zealand pale lilac, pale yellow, greenish and frequently white; exceptionally red *(Metrosideros),* yellow *(Sophora).*)

The most colourful plant right now is *Fuchsia excorticata.* Near the edge of the river, rather large stands of it in clearings, many twisted, rose-coloured trunks with peeling purple and brown bark, fading yellow leaves clinging and falling on the dark green and orange *Polystichum* fern. And presently a swamp forest with very tall "white pine" *(Podocarpus dacrydioides)* on eroding banks, some of their immense shafts toppled over into the river. Big arching boughs of deep green *Coriaria* alternating with enormous silver-green tufts of *Danthonia cunninghamii* (this species never dominant anywhere, although quite gregarious where it occurs).

The Mid-Hut Clearing where we stop for lunch has an air of the Argentine pampa. A flat with grasses grazed down to a smooth carpet interspersed with immense bouquets of New Zealand flax *(Phormium tenax),* their sword-like green leaves springing up under the heather-like manuka *(Leptospermum scoparium)* and alternating with large tufts of *Arundo conspicua,* with the ghostlike white plumes of its inflorescences rising high above the dull blue of its leaves. Now the sun has come out and plays on the grass and cuts the shadows deeper. We walk farther into the forest to a beautiful stand of podocarps and silver beech. The now familiar pearl-gray robin accompanies me curiously as I make notes and collect mosses, the fantails fly in my face, and enormous multicoloured wood-pigeons alight heavily on the boughs above. Some parts of this forest have rather a dense layer of *Microlaena avenacea,* a very broad-leaved sylvatic grass possibly indicative of a regressive stage; in other areas *Blechnum discolor* or *Polystichum vestitum* take over.

I am hard put to make out the pattern of riparian vegetation in New Zealand. So much of the river-edge territory is now overwhelmed by exotics *(Lupinus, Ulex, Salix,* etc.). "What was there before?" "Nothing," they say. Is this possible? Can there have been so many vacant niches? Is this why such species as *Leptospermum scoparium* and *Phormium tenax* have made so much place for themselves? I am looking for analogies with Gaspé on the gravel flats (platières) of the rivers here: are there any alpine species

*This arbitrary decision was made in: P. Dansereau, 1958, "A universal system for recording vegetation," Contrib. Inst. Bot. Univ. Montréal, 72:1-58.

Arundo conspicua, a relative of the pampas grass, very abundant along streams in the Hollyford Valley. Typical fiordland escarpment in the background, with beech forest on the lower slopes.

descended from above (like *Epilobium latifolium* and *Dryas drummondii*)?

We walk back through the forest, under the giant beeches and podocarps, and we take leave of Dorizac. On to Milford Sound by driving upwards to the tunnel and plunging down into the fiord. It is dark now, and all we see is the Milford Lodge, a tremendously luxurious, centrally heated hotel. Warm bath and shower, good cocktails, food à l'européenne. We relax to the dissolving point. I use up a spark of energy to write a note to the Robert Cushman Murphys with whom I was here in 1949.

610505.—MILFORD SOUND—DUNEDIN

I have often told the story—since 1949—of the tea-girl who comes into your room unannounced at 7:00 A.M. and is unperturbed if she finds you standing naked in the middle of the room. "Your tea, sir!" she says. Well, that is how this day starts. Pour de vrai! and cross my heart!

No sunshine this morning, but rapidly drifting mists over and around Mitre Peak and in and out of the fiord passages. All silver and black and silver-green and purple-black. It is a wet, wet wind that carries a few disconsolate gulls. We stop at Chasm Falls and look down upon the polished rocks with their hollowed pocks like bone sockets.

A pause on the west side of Homer Tunnel, and Geoff and I run upslope into some lovely subalpine scrub. *Senecio bennettii* forms a dome of smooth blue-green leaves; many very small-leaved (leptophyll) shrubs form a meagre cloud of foliage in their divaricating branches *(Pittosporum crassicaule, Coprosma pseudocuneata, Archeria traversii);* matted shrubs, like *Podocarpus nivalis,* shade out all undergrowth, whereas a rosette-shrub like *Dracophyllum menziesii* allows a number of alpines to form carpets *(Pentachondra pumila, Coprosma pumila);* tussock *(Danthonia flavescens)* also fuses through like a spray of gold. The hollows harbour an even higher thicket of silver beech, a small island of tall scrub with many sylvatic species *(Hymenophyllum multifidum* amongst others: imagine a filmy fern at the subalpine level! M. Gaussen would certainly call it pseudo-subalpine!). A sheath of mosses on the branches of the beeches, and large foliose lichens *(Sticta)* on the mosses.

Through the tunnel, and several stops before lunch at the chilly Cascades. And then awhile in the beech forest. This is really breath-taking. Enormous trunks of the red beech *(Nothofagus fusca)* rising out of sight, its foliage denser than the shimmering silver beech *(Nothofagus menziesii).* But covered with a seamless clothing of bright green mosses and liverworts. And we are ankle-deep in an unbroken carpet of mosses. On the forest floor, practically no ferns, except epiphytes themselves overwhelmed by the shrouding mosses. And stuck like pins in this drapery, innumerable young beeches with their unsubstantial foliage. No tree ever cut. All logs rot in situ. Another stand appears less stagnant, has some bare spots where the litter is slowly decomposing and from which *Polystichum vestitum* at least can rise.

The afternoon is well gone when we start for home, descending flat after flat to Te Anau and veering eastward to Mossburn and Dunedin.

610508. DUNEDIN

Graduation ceremony, "capping" as they call it here. Held at this time of year as a hangover from the not-too-distant period when exams (November) were "marked" in England and results forwarded only months later. Not a too solemn ceremony, nor self-conscious. Usual rush of proud parents.

610509. DUNEDIN—THE HERMITAGE (MT. COOK)

Off in late morning with Geoff. Nice sunny day. Picnic by roadside in sheep range. Grassland country all the way. Areas of golden limestone (used by some churches) and yellow grass, mostly fescue *(Festuca novae-zealandiae).* On roadside, introduced *Artemisia.* The gray clouds of matagouri *(Discaria toumatou)* hang in tufts everywhere, in ravine, along stream edges, or are statically scattered in fields. Pink-leaved willows on silted rivers. Mountains very blue, especially where beech-clad. Some areas up here nearly as "continental" as Central Otago (witness apricot trees and some scabweed). The introduced rose from Europe *(Rosa eglanteria)* all over the landscape, really lovely with its yellowing leaves and its heavy crop of scarlet hips. Nearing the Trail many small stands of naturalized larch *(Larix decidua)* still holding its golden leaves. This area (below the beech, at a dry subalpine level) potentially very good larch country. A missing zone to be filled which is now uncertainly occupied by tussock and by beech—

Flat sheep country near Mossburn. In foreground, hedge of gorse *(Ulex europaeus)* with scattered Monterey pine *(Pinus radiata).*

maybe not very well by either. It is dusk when we reach The Hermitage, another government-operated hotel, very nicely built on a slope, on several levels. Our room, spacious, well-furnished, and heated. Henry Connor greets us at the door, and we have a pleasant cocktail and dinner together. Food excellent. (I really must revise my prejudices!)

610510.

The tea-girl says: "D'you wont the cu't'ns drone?" and lets in a flood of ice-blue light shining on the fullness of Mt. Cook. I go out on the wooden balcony. And there on the workshed is perched a kea, shaking its green parrot-head and flapping its crimson-lined wings.

Geoff, Henry Connor, Tom Detwyler, and I set off on the Hooker Track (do not say Trail, but Track!). All day we walk, all day we see the great pyramid of Mt. Cook ahead of us, and yet it seems no nearer. Blue and white in the morning, turning to pink in the afternoon, and eventually to a very cold steel-blue in the dusk.

Moraines of all ages. Well-consolidated and completely subsided débris with scrub which has worked all the interstices. The matagouri does not last too long up here, is soon displaced by other equally twiggy shrubs such as *Coprosma rugosa, Hymenanthera alpina, Pittosporum anomalum.* These form a perfect basketwork of interlacing divaricate branches. *Dracophyllum kirkii* is another one with an unusual habit for a *Dracophyllum.* (It hybridizes with *D. longifolium? uniflorum?)* In the course of the day we are able to sample most of the successional stages, for we walk up to the foot of the Hooker Glacier and climb right on top of the live ice and its coverage of débris. We walk through low plains of blond tussock *(Festuca matthewsii, Danthonia rigida)* and over the backs of several moraines to the crumbling black ice that terminates the lobe of Hooker. Milky green pools are imprisoned at its base, and from them and from under the ice flows the short Hooker River, on clear gravel.

On top of the ice itself, a chaotic accumulation of boulders of all sizes, mostly between twenty-five and forty cm. in diameter. Between them, pockets of gravel and coarse sand. Among this chaos a tuft, here and there, of *Poa novaezealandiae.* The other species are even more widely scattered: *Poa lindsayi, Agropyron scabrum, Epilobium melanocaulon, Myosotis traversii.* Only one moss, *Rhacomitrium crispulum,* very rare indeed. No lichens. This is the beginning. Other pioneer stages involve a greater number of species but a very small coverage at first. A remarkable plant is *Helichrysum depressum,* a totally gray plant, never green, not unlike *Dryas integrifolia* in the Arctic. Also the red-leaved (always red?) *Epilobium melanocaulon* (melano?). Where slope not too steep, or on flat hard pebbly ground: a matted network of *Raoulia glabra* and eventually great cushions of *Rhacomitrium lanuginosum* var. *pruinosum;* then, as in a pincushion: *Parahebe bidwillii, Festuca matthewsii,* and even larger plants like the stinging golden rosette of *Aciphylla colensoi* and the silver crown of *Celmisia coriacea.* Actually the next step is indicated by the nitrogen-fixing *Coriaria thymifolia,* and with the coming of *Gaultheria depressa* consolidation sets in, and a host of *Coprosma* spp. with *Dracophyllum uniflorum,* and also some much taller plants *(Phormium colensoi, Phyllocladus alpina, Podocarpus nivalis).* The two latter, with *Olearia nummulariaefolia* and *Senecio bennettii,* and *Dracophyllum longifolium* eventually form a tall and very dense scrub, rich in species, containing many epiphytic mosses and lichens. Climax at this level.

There must be a rather complex migratory movement along this glacial river, further complicated by fire and grazing. Some of the flats (not too recently deglaciated) have extensive fescue *(F. matthewsii)* prairie mixed with *Danthonia* (both *D. flavescens* and *D. rigida).* This is where several *Dracophyllum* species *(longifolium, kirkii, uniflorum,* also *rosmarinifolium?)* meet and probably hybridize. Mass collection here.

Walk back in chilling sunset, with good collection and notes. Mt. Cook drained of pink-flush to icy blue, to violet ravines and black-green valley. End of day is dragging feet, stumbling and brushing against leaves already wet, and harsh leaves and thorns. The matagouri always a bit ghostly gray, especially where hung with pale wisps of lichen.

The Hermitage very cheerful. A barful of loud Australians. Good New Zealand wine offered by Geoff at dinner.

610511.

This day not so good. Valley choked with low clouds. All perspectives closed by rain curtain. Rain in my eyes and down my neck and eventually up through the soles of my boots swish-swash. It is getting wet, not being wet, that is unpleasant. And now really to enjoy the vegetation since I am at one with it. The ghostly screen of matagouri, this cloud of thorns seen at dusk is now inky against the rubble of the vast fan of a scree that we must cross with slippery feet. The planted larches that have seeded themselves on White Horse Hill are radiant gold in this gloom. We look intimately into a new type of subalpine scrub with a curiously imbricate small-leaved (almost lycopodioid) senecio *(S. cassinoides)* and walk up the Kea Point Track. Henry and Geoff discuss National Park policies (Geoff is on Fiordland Park Committee, Henry on Mt. Cook Park Committee, and the dialogue is like Montreal-Quebec, New York-Chicago, Geneva-Lausanne, and no doubt Buda and Pesth!). Henry points out that every bench has been placed so that the unsuspecting tourist (so reluctant to be educated) is obliged to look at certain plants (nicely dégagées, right under his nose) and certain views (quite blank at present). Not too clear what the undisturbed vege-

tation, even less the climax, would be right here. *Podocarpus hallii* gets to be quite tall and grows with *Griselinia, Phyllocladus,* and a great deal of *Senecio bennettii.*

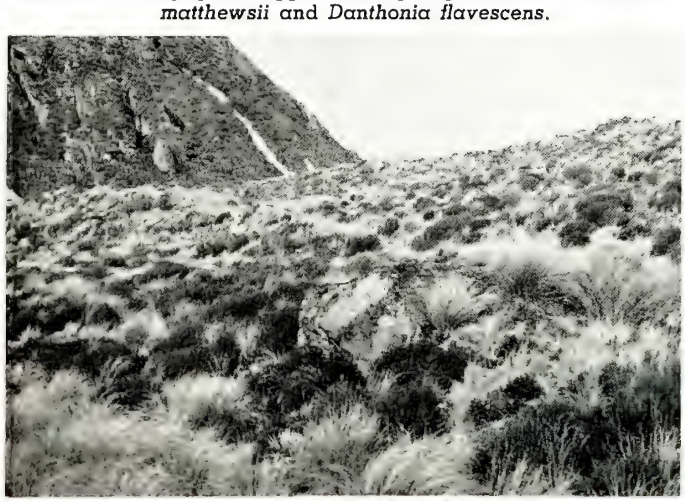
Home to The Hermitage to dry, bathe, drink, and to an excellent meal, and we are off again, dry at first and soon wet. Governor's Bush is the ultimate stand of beech in this region. Eastward, no lowland podocarp forest, but tussock grassland. This is silver beech *(Nothofagus menziesii),* and it attains sixty feet or so, quite dense. Understory of *Podocarpus hallii* and other lowland or montane elements *(Pittosporum tenuifolium, Pseudopanax crassifolium, Griselinia littoralis, Coprosma parviflora)* but also some subalpine species *(Phyllocladus alpina, Coprosma pseudocuneata).* The floor of this forest not mossy, rather conspicuously covered with leaf litter, somewhat like an Appalachian deciduous forest. A few hundred feet up, beyond the beech line or near it, a dense scrub with an eight-meter ceiling (therefore scrub and not forest!), dominated by *Senecio-Phyllocladus-Dacrydium bidwillii,* with a great layer of ferns *(Blechnum minus),* and quite a lot of *Coprosma pseudocuneata,* and heavy epiphytic growth from the ground up. Une fois mouillé, it is a pleasure to brush against the ferns and to feel the coolness of the sheathing mosses pearly with condensed cloud, the papery *Sticta* spreading their green perforated fringes over the mosses, curling at the tips and showing the white, gray, or golden layer beneath. There seem to be at least four species. The *Usnea* branches gaily from its button-like nodes, not seeming to get wet. But are we ever!

610512. MT. COOK—DUNEDIN

We decide to go back to Dunedin, for it has become impossible to ascend to the alpine level. I may never see the *Danthonia crassiuscula* alpine meadow! Goodbye to Henry, and we go down the valley. At first a drizzle, and then a filtering of pale light from the green sky on the horizon. The mountains on all sides dark serge-blue, the rivers lead-gray bordered by pink-leaved willow *(Salix fragilis),* and in the foreground the pale straw of the fescue, the blue-gray of the matagouri. Monterey pines always seem inky in such an aqua-tinted landscape. The weeping willow still surprisingly green.

We stop for lunch in Duntroon. Simple country inn, as ugly as you please (Eastern Townships of Quebec style). Outside of front door (to bar) a canary in a cage (alive). Barman very cordial. A couple of Pimms and a really good meal for a very small price. Doilies on table. Chromos on wall. No heating to stifle your appetite.

Along the Hooker Track at Mount Cook: a low moraine with several *Dracophyllum* spp. invading a grassland of *Festuca matthewsii* and *Danthonia flavescens.*



End of the Hooker Track. Black ice crumbling in the foreground, Mt. Cook in background.

610514. DUNEDIN

Apartment, in spite of cold corridor and icy bathroom, is home. Nice to resume habit. Small, warm office for writing. Large Senior Laboratory to spread, sort, number, and press plants.

610518.

Visit to Botanical Garden Director Mr. Skipworth. Am very well received and shown impressive collections of trees and shrubs, assembled by continent. New Zealand and Australian section simply magnificent. Asian collection very good, too. But almost nothing from North America. Have not obtained anything, they say. I shall try for them. No botanist here, no study, no experiment. But when they decide to do something, they will have a running start, with their fine arboretum. Several *Cistus* have run wild: *C. populifolius, C. laurifolius, C. villosus, C. hirsutus.*

(To be Continued)

UTILITY OF BOTANICAL GARDENS (Continued from page 107)

lems, and a botanical garden where he can plan, organize, and accumulate material for his extensive work, is a necessity. A well-organized botanical garden is equipped to train men so that they will be able to assume the responsibilities in various botanical activities, that the modern world demands from them.

In India, a humble attempt has been made in this direction. At Lucknow, in the National Botanic Gardens, an attempt has been made to demonstrate the usefulness of such efforts. Within a period of thirteen years such problems as desert reclamation, cultivation in alkaline soils, and education of workers on mass scale have been successfully demonstrated. Side by side with these activities, the fundamental work in the botanical and phytochemical fields has also been carried out.

An exchange of ideas is the keynote of human progress. The botanical gardens are the most innocent, but the most

effective way of bringing about the diffusion of healthy ideas. History shows how the botanical gardens and the museums in the West have given facilities to workers where they may extend their knowledge with the least efforts. The idea of evolution in plants and animals would have remained meaningless, if the visual representation of plants and animals had not been organized in the botanical gardens, museums, and herbaria of the West.

Then, again, for the exchange of plant material botanical gardens are a necessity. Most of us forget the part played by botanical gardens in the development of modern industry. A little thought would bring to light that all the modern industrial development would not have occurred, if the West had not tried to bring spices from the East. It is the mingling of the West with the East, or the East with the West, that has created the modern world with space astronauts. The more we blend with each other, the more vitality we shall develop to achieve the ideals of the human race. Hawaii is ideally situated for such efforts. To us in the East it is the rising sun, and to the West it is the glorious setting sun.

ROSES OF THE PAST (Continued from page 104)

cessful dispersal of roses? Their unchanged appearance and ubiquitous occurrence in the temperate northern hemisphere today demonstrate a conservatism of development and a certain tenacity, or rather successful adaptation to many ecological environments. This question again returns us to the vagaries of evolution, to natural selection through elimination of unfavorable characteristics or, conversely, the preservation and extension of features valuable for survival. The clue lies in "But ne'er the Rose without the Thorn," especially during early rose history. The fossil-rose record yields leaves with petiolar thorns, detached thorns, and sections of stems with thorns attached. Some stems are thin, others nearly an inch in diameter, suggesting strong shrubs or even climbers like our 'Silver Moon'. These spines proved a basic and extremely successful survival factor in this dog-eat-dog organic world; their function appeared completely adequate to obviate any further change. Spines have remained a protection against foraging animals to this day, so that only small beetles, fungi, bacteria, and nematodes affect the softer parts. These less conspicuous enemies also trace their history back to the earliest record of the roses; we find fossil leaflets with spots and small round colonies of fungal or bacterial origin, and with irregular missing areas, evidence of hungry beetles. Rose thorns and flowers in their relations with insects have been so highly adapted for the past fifty million years that even a changing geological environment has had no effect on the appearance of the rose. Although authentic fossil-rose petals have never been found, a five-pointed rose calyx *(Rosa ? inquirenda)* exists, in size and shape not different from that of a living rose. Dispersal of rose seeds through birds and other animals was doubtless an initial factor in the successful extension of their range. It is impossible to think of roses without visualizing a host of insects visiting their flowers on a sunny day; the plant and the insect are completely dependent on each other for the continuance of their species. The Tertiary Florissant of Colorado and the Ruby area of Montana abound with flies, bees, wasps, and bumble bees. Even a few butterflies that date back to the Cretaceous exist. The relative dearth of butterflies in the fossil record, however, may well be explained by their conspicuous nature which makes them easy prey for robber flies and birds. They often have a short life-span because of the telescoped seasons at higher elevations, and when dead they are disposed of by ants. Imagine the colors, the fragrance on a sunny day, the total effect of blossom-covered wild roses, enhanced by a multitude of busy insects. Such visions were reality along the banks of clear and splashing streams, on the arid pediments and hills, in arroyos and flat mesas, along the crumbling walls of gullies, or between the protection of sturdy boulders.

Fossil roses in full bloom, their fragrance long wafted away by gentle winds, have never intoxicated man, but he, in his imagination, recreates them on the strength of a few fragile slabs of shale.

SOME NATIVE PLANTS (Continued from page 91)

bark of its roots, is used extensively in flavoring medicines and scenting perfumery.

During Colonial days the ague-tree was in great demand as a tea, mostly as a spring tonic and blood cleanser after a long winter lacking in fresh vegetables. It is still used by both country-folks and city-dwellers. The bark of its roots, tied in little bundles, may be found in early spring in markets and chain-stores. It is one of the few "old-timers" that is still with us.

The Choctaw Indians of the Bayou Lacomb brought the dried, tender young shoots of sassafras to the cooks of early New Orleans. Ground and passed through a sieve it was called "file powder" and became an additive to gumbo. A tablespoon of the powder is stirred into the gumbo, just before serving, but is not allowed to boil.

Surely Virginia should be proud to claim the fringe tree *(Chionanthus virginica)* in her native flora. Its name is derived from two Greek words meaning snow and blossoms. The many small flowers are borne in dense, fluffy panicles, and when the tree is in bloom, it looks as though it were covered with the finest of bridal veils. The corolla is snow-white and faintly fragrant. In May and June *C. virginica* presents an unforgettable sight along river banks and elevated places. I have never found it growing along the roadside, only in deep woods. Later it can be recognized by its fruit, a fleshy, oval, purple drupe. Its virtue is in the bark of its root, which is an aperient and diuretic and by some regarded as a tonic. It has been highly recommended for gallstones.

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BRIEF NOTES ON RECENT BOOKS

By ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

FOR YOUNGER READERS

CYRUS Mc CORMICK: FARMER BOY. Dobler, Lavinia. 200 pages, colored illustration, bibliography. (Childhood of Famous Americans) Bobbs-Merrill Co., Indianapolis. 1961. $2.25.

The thrilling story of a farm boy who grew up to be the famous inventor of the reaping machine that brought great wealth to thousands of farmers the world over.

FIND A CAREER IN AGRICULTURE. Duncan, Clyde H. 160 pages, illustrated, indexed. G. P. Putnam's Sons, New York. 1961. $2.75.

This welcome addition to the "Find a Career Series" presents important pros and cons and offers recommendations for educational preparation for those who are planning to engage in agriculture.

FUN-TIME TERRARIUMS AND AQUARIUMS. Leavitt, Jerome, and John Huntsberger. 47 pages, colored illustrations. Children's Press, Chicago. 1961. $2.50.

Terrariums and aquariums are becoming more and more popular in classrooms and in homes because, for the most part, they are easy to maintain. Although the elementary text and pictures are slanted towards the young naturalist, teachers and parents should also find this little book helpful.

THE GIANT GOLDEN BOOK OF BIOLOGY: AN INTRODUCTION TO THE SCIENCE OF LIFE. Ames, Gerald, and Rose Wyler. 99 pages, colored illustrations, indexed. Golden Press, New York. 1961. $3.95.

The magnificently illustrated "Giant Golden Book Series" is transforming the tedious task of study into painless adventure full of surprising discoveries. In the foreword of this present volume, Professor George Wald of Harvard University, writes his endorsement as follows: "I knew I would like this book when I read on the first page: 'Questions are just as important as answers' . . . I learned a lot from it, though I have been a scientist and teacher for many years . . . It isn't just a child's book, whatever that might mean. All of us who are scientists know that it is the questions children ask that are the hardest to answer."

I WANT TO BE A SCIENTIST. Greene, Carla. 30 pages, illustrated (part colored). Children's Press, Chicago. 1961. $2.00

A very tiny boy named Jack has fun watching bean seeds grow. Because he is curious and watches them closely, he makes all sorts of discoveries and is on the way to becoming a budding scientist. For the youngest of readers.

IMPORTED INSECTS. Talley, Naomi. 64 pages, illustrated, indexed. The Dial Press, New York. 1961. $2.50.

Stimulating accounts of insect immigrants to America from distant lands, which have proved helpful in combating harmful insects in our gardens and forests. Helen Damrosch Tee-Van's illustrations reflect scientific accuracy as well as artistic distinction.

LEAVES. Parker, Bertha M. 36 pages, colored illustrations. (The Basic Science Education Ser.) Golden Press, New York. 1961. $1.69.

Hard-cover edition of an excellent little elementary book.

PLANT EXPLORER: David Fairchild. Epstein, Beryl W., and Samuel Epstein. 192 pages, bibliography, indexed. Julian Messner, New York. 1961. $2.95.

Although written for youngsters, I recommend this to ages from nine to ninety-nine. It is a vivid account of a man who was dedicated to plants at home and in far corners of the world and who lived to see the establishment of the Fairchild Tropical Garden, named in his honor by the late Colonel Robert Montgomery. Colonel Montgomery was for many years a member of the Board of Managers of The New York Botanical Garden.

PLANTS ROUND THE YEAR. Blough, Glenn O. 36 pages, colored illustrations. (The Basic Science Education Ser.) Golden Press, New York. 1961. $1.69.

Another old favorite in a hard-cover edition. Excellent elementary text and illustrations.

SCIENCE IN THE GARDEN. Marcus, Rebecca B. 25 pages, illustrated (part colored). Franklin Watts Inc., New York. 1961. $1.50.

A former New York City science teacher has chosen the garden as a laboratory and cleverly instructs the very young reader.

SEE ALONG THE SHORE. Selsam, Millicent E. 44 pages, colored illustrations. Harper and Bros., New York. 1961. $2.95.

A splendid book for the young naturalist, with interesting facts for the oldster as well.

SILKWORMS AND SCIENCE: THE STORY OF SILK. Cooper, Elizabeth K. 160 pages, illustrated, indexed. Harcourt, Brace and World, New York. 1961. $3.00.

Another fine title with splendid photographs by the author of *Science on the Shores and Banks* and *Science in Your Own Back Yard.* Not only does Mrs. Cooper describe the history of silk, but she also gives easy-to-follow directions for raising silkworms.

SUGARING TIME. Russell, Solveig P. 48 pages, illustrated, bibliography, indexed. Abingdon Press, New York. 1961. $2.00.

A simply told story for the very young about a truly American industry — maple sugaring, with all the fun of "sugaring off" parties included.

SWAMPS. Goetz, Delia. 64 pages, illustrated. William Morrow and Co., New York. 1961. $2.75

The mysterious inhabitants of swamps, both plants and animals, are ingeniously illustrated and described for pre-teen readers.

USEFUL PLANTS AND ANIMALS. Blough, Glenn O. 36 pages, colored illustrations. (The Basic Science Education Ser.) Golden Press, New York. 1961. $1.69.

A reissue in a hard-board edition.

WHO LIVES IN THIS MEADOW? A STORY OF ANIMAL LIFE. Blough, Glenn O. 48 pages, illustrated (part colored). McGraw-Hill Book Co., New York. 1961. $2.50.

Dr. Blough is a past master of holding the attention of young nature explorers with odd stories of plants and animals which lie waiting to be discovered.

TREES AND FORESTRY

ADVANCES IN MANAGEMENT OF SOUTHERN PINE: Proceedings of the Tenth Annual Forestry Symposium. Crow, A. B., ed. 117 pages, illustrated, bibliographies, indexed. Louisiana State University Press, Baton Rouge. 1961. $4.00.

For the decade an annual symposium, centered around the subject of southern forestry practices, has been held at Louisiana State University. Included in the proceedings of the 1961 symposium is an author index to all of the papers given at the ten symposia from 1952 to 1961.

FOREST ENTOMOLOGY. Thatcher, T. O. 225 pages, illustrated, bibliography, indexed. Burgess Publishing Co., Minneapolis, Minn. 1961. Paper, $4.50.

A handy reference guide for the practicing forester and college student who need identification keys with non-technical names and terms and a general presentation of insect structure, development, and behavior.

FOREST PATHOLOGY; 3rd ed. Boyce, John S. 572 pages, illustrated, bibliographies, indexed. McGraw-Hill Book Co., New York, 1961. $12.50.

A standard text, first published in 1938, revised and updated with new appendices for fungicides and a list of common names of plants used with scientific equivalents. Dr. Boyce is Professor Emeritus of Forest Pathology at Yale University.

TIMBER: America's Magic Resource. Elmer, Manuel C. 208 pages, illustrated, indexed. Christopher Publishing House, Boston, Mass. 1961. $4.00.

Man's dependence on the products of forest trees, "from fire wood to refined cosmetics; from structural timbers to the finest plastics," has long been a subject of vital interest to sociologist Dr. Manual Elmer. In this readable account of trees and people, he does not overlook the non-material value of our forests and voices an ardent plea for their conservation.

TREE-SORT: THE POCKET TREE COMPUTER. Forester, Joseph E. 156 cards, illustrated, directions' folder with glossary, sorting needle, boxed. The Sort-Card Co., Boulder, Col. $6.00.

A punch-card method for the identification of 260 native and exotic trees of the United States and Canada, with over nine hundred illustrations of leaves, fruits, flowers, and tree silhouettes. Here is an intriguing challenge to test one's accuracy of observation.

YOUR FUTURE IN FORESTRY. Hanaburgh, David H. 150 pages, bibliography. Richards Rosen Press, New York. 1961. $2.95.

A forester's appraisal of the kind of career

he has successfully followed. Detailed information concerning requirements, schools of forestry, preparatory reading, and the diversified openings in the field. The chapter entitled "Self-Evaluation Test" should be required reading for prospective young foresters.

REGIONAL BOOKS

THE CLOUD FOREST; A CHRONICLE OF THE SOUTH AMERICAN WILDERNESS. Matthiessen Peter. 280 pages, illustrated, indexed. The Viking Press, New York. 1961. $6.50.

To those who read *The New Yorker*, Mr. Matthiessen needs no introduction; portions of this text have appeared as a series in that periodical. What an enviable, adventurous young man with rare writing ability and love of the history, people, and wild life of South America.

COASTAL PLANT GEOGRAPHY OF MAURITIUS. Sauer, Jonathan D. 153 pages, illustrated, bibliography. (Coastal Studies Ser. No. 5) Louisiana State University Press, Baton Rouge. 1961. $3.00.

A comprehensive report of the botanical work of a geographic reconnaissance during the Southern Hemisphere winter of 1959. In Dr. Sauer's words: "Mauritius is an island far out in the Indian Ocean—a field worker's paradise." Appendices include a geographic list of sites studied with ecological tabulations and a systematic list of plant species encountered.

COMMON PLANTS OF THE SOUTHERN CALIFORNIA MOUNTAINS. DeLisle, Harold F. 64 pages, illustrated (cover in color), indexed. (Amer. Wildlife Region Ser. Vol. 5) Naturegraph Co., Healdsburg, Cal. 1961. paper, $1.00.

Issued as Section I of the Natural History of the Southern Mountains edited by Vinson Brown. A compact pocket-size booklet, well illustrated with line drawings for ready identification, with the edible plants designated.

GARDENING IN SOUTH TEXAS. Renton, P. A. Jr., H. R. Newcomer, and Roy C. Bates. 159 pages, illustrated, indexed. The Naylor Co., San Antonio, Texas. 1961. $3.95.

The President of the San Antonio Garden Center writes in the foreword: "This most welcome book written by three dedicated gardeners . . . will doubtless be a much-used and often-quoted guide." Particularly useful are the planting charts of recommended plants with notes as to height, blooming time, and specific culture.

HANDBOOK OF PLANTS OF THE COLORADO FRONT RANGE. Weber, William A. 232 pages, illustrated glossary, bibliography, indexed. University of Colorado Press, Boulder, Col. 1961. Cloth, $4.00; paper, $2.50.

A revised, second printing of an excellent booklet originally published in 1953. The keys should be useful for the serious student and also for those with little botanical knowledge, who are willing to give them a try.

A MIDWESTERN ALMANAC; PAGEANT OF THE SEASONS. Rand, Austin L., and Rheua M. Rand. 176 pages, illustrated, indexed. The Ronald Press, New York. 1961. $4.50.

When the authors first moved to Indiana, they found no nature almanac for predicting seasonal events in the plant and animal world. And so they began to make random notes of wildlife happenings, which are now recorded so delightfully in this book.

A NATURALIST IN ALASKA. Murie, Adolph. 302 pages, illustrated, indexed. (Amer. Naturalist Ser.) Devin-Adair Co., New York. 1961. $6.50.

There is a growing interest in books that deal with the natural history of our forty-ninth state. Here is a fine recent addition by a field research biologist of the National Park Service, who knows and loves the north country and portrays it so vividly.

A STUDY OF CERTAIN PLANT AND ANIMAL INTERRELATIONS ON A NATIVE PRAIRIE IN NORTHWESTERN MINNESOTA. Tester, John R., and William H. Marshall. 51 pages, illustrated, bibliography. (Occ. Papers No. 8, Minn. Mus. Nat. Hist.) University of Minnesota Press, Minneapolis. 1961. paper, 50 cents.

An ecological report with extensive bibliography of recent research that has been carried out from the Lake Itasca Forestry and Biological Station. The site studied was the Waubun Prairie Research Area in Mahnomen County.

WILDLIFE OF THE NORTHERN ROCKY MOUNTAINS INCLUDING COMMON WILD ANIMALS AND PLANTS. Baker, William H., Earl J. Larrison, Charles Yocom, and I. J. W. Baxter. 112 pages, illustrated, bibliography. (Amer. Wildlife Region Ser. Vol. 6) Naturegraph Co., Healdsburg, Cal. 1961. cloth, $3.50; paper, $1.95.

Just the thing to carry along on the next trip to the West—light in weight but loaded with good pictures and full descriptive notes.

YOUR FLORIDA GARDEN; 4th ed. Watkins, John V., and Herbert S. Wolfe. 392 pages, illustrated (part colored), indexed. University of Florida Press, Gainesville. 1961. $6.50.

When publishers continue to bring out new editions of an old standby, it speaks well for the work of the authors. This revised edition has an additional chapter on the culture of orchids in Florida.

YOUR GUIDE TO FLORIDA LANDSCAPE PLANTS: Palms, Trees, Shrubs, Vines. Watkins, John V. 293 pages, illustrated. University of Florida Press, Gainesville. 1961. $6.50.

Dr. Watkins, who has been a professor at the University of Florida since 1926, has several excellent texts for Florida gardeners to his credit. For this latest work he has taken 281 plant subjects and treated each with full descriptive and cultural notes. Landscape uses are emphasized. Helpful also are his numerous lists of plants for special situations and his tabulation of popular landscape plants that are reported to have possible toxic qualities.

WALKS AND RIDES IN CENTRAL CONNECTICUT AND MASSACHUSETTS. Longwell, Chester R., and Edward S. Dana. 229 pages, illustrated, bibliography. Shoe String Press, Hamden, Conn. 1961. $4.50.

As a reprint of the 1932 edition in its original form, this volume must be used with discretion. Because of suburbanization, some of the suggested walks are no longer feasible. A few changes would have made the volume more useful. In a book published in 1961, it is startling to find the 1896-98 edition of Britton and Brown and the 1908 edition of Gray listed in the works on botany. The same criticism applies to the prices of the United States Geological Survey maps in the section on map equipment. The short section on vegetation and the major portion of the work on geological formations are still useful.

LYNETTE L. SCRIBNER

REVIEW OF RECENT BOTANICAL BOOKS

A FLORA OF THE ALASKAN ARCTIC SLOPE. Wiggins, Ira L., and John Hunter Thomas. x + 425 pages, 151 distribution maps, glossary, bibliography, indexed. (Arctic Institute of North America Special Publication No. 4). University of Toronto Press, Toronto, Canada. 1962. $9.50.

This book, restricted in its geographic scope to the summit-line of the Brooks Range and its drainage northward into the Chukchi and Beaufort seas, provides the first comprehensive treatment of the higher plants of the largest tundra area of the United States. Chapter 1, "The Area," gives an extremely illuminating account of the physical conditions that affect the growth of plants, under the headings of Geographic Limits, Edaphic Factors, Climatological Factors, Permafrost, Biological Factors, and Habitats. The main body of the book, consisting of keys to and description of all taxa, covers 435 species, 153 genera, and 57 families. Of the 435 species, 16 are pteridophytes and only 1 a gymnosperm—all the rest are angiosperms, with 109 monocots and 309 dicots. The largest genera are *Carex* (38 species), *Salix* (20 species), and *Saxifraga* (19 species).

For the first time, the working biologist who needs to identify plants from arctic Alaska has available to him a book designed expressly for this purpose by experts familiar with the area. The citation in the text of specimens actually examined by the authors and the known distribution of species shown by maps will be useful not only in the identification of plants but also in developing specific ideas of plant distribution in the Arctic, especially when related to the statement of the general range of each species. All in all, this book will undoubtedly take its place as one of the most original and needed floristic works to be published during the current year.

WILLIAM C. STEERE

VASCULAR PLANTS OF THE PACIFIC NORTHWEST. Hitchcock, C. Leo, Arthur Cronquist, Marion Ownbey, and J. W. Thompson. Part 3: Saxifragaceae to Ericaceae. 614 pages, illustrated, indexed. University of Washington Press, Seattle. 1961. $13.50.

Of this flora, to be completed in five parts, Parts 5 and 4 have appeared, in that order, and now we have Part 3. The present volume is primarily the work of Hitchcock, with Cronquist contributing the account of the genus *Rosa* and the family *Umbelliferae*. The style

(Continued on page 119)

NEWS, NOTES and COMMENTS

Activities of the Director and Staff. Within the past several months Dr. William C. Steere, Director, has attended a panel session at the University of Alaska, sponsored by the National Science Foundation, to consider the advisability of establishing a biological center there; a meeting of the United States—Japan Committee on Scientific Cooperation, sponsored by N.S.F., in Washington, D. C.; meetings of Commissioner Allen's Committee on Museum Resources in New York City; and the annual flower show luncheon of The Garden Club of America at the Waldorf-Astoria in New York City. Dr. Steere gave the evening lecture on "Biology of the Tundra" at seminars held at Augustana College, Rock Island, Illinois, and at Southern Illinois University; participated in N.S.F. site visits to Lake Texoma Biological Station and Fisheries Research Center of the University of Oklahoma and the Marine Laboratory of Texas A and M, Galveston; attended the Sixth Annual Conference of Directors of Systematic Collections, in Washington, D. C.; and the dedication ceremonies of the Nelson Biological Laboratory at Rutgers University.

Dr. Pierre Dansereau, Assistant Director (Botany) lectured to the Torrey Botanical Club on the Macaronesian Islands; to the Advisory Council of The New York Botanical Garden on African vegetation; at Yale University (Botany Department Seminar) on "The Functional Analysis of Vegetation in New Zealand"; and discussed some of his work "from the tundra to the mangrove" before the Hortus Club. Dr. Dansereau was invited to the University of Puerto Rico for a week, where he gave a series of five lectures on "The Vegetation of the World," with special emphasis on climatic correlations and small-scale mapping. He participated in several excursions with Dr. Gustavo Candelas, Dr. H. Heatwole, Dr. Eric Matthews, and Roy Woodbury. He will participate in a three-day symposium at the Connecticut Agricultural Experiment Station, New Haven, on the principles of ecology and their application to suburban forests; and in the International Conference on Palynology at the Geochronological Laboratories of the University of Arizona, Tucson. This will be preceded by a field trip to Tamaulipas and the Chihuahua desert (Mexico). The special purpose of this expedition is to study the bioclimatic relationships of the cloud forest. Dr. Dansereau has been invited by the C. C. Adams Center for Ecological Studies (Western Michigan University, Kalamazoo) to give seminars and a public lecture.

T. H. Everett, Assistant Director (Horticulture) and Senior Curator of Education, in addressing members and friends of the Denver (Colorado) Botanic Garden in February, said that the seeds of mankind's future are being planted in the world's botanical gardens, but man couldn't care less. The situation is unfortunate for botanists and gardeners alike, but could mean disaster for the human race.

"People do not realize the importance of plants in their lives. Plants can live without animals, but animals, including man, cannot live without plants. All food depends on plant life; even beef and other meat dishes are possible only because animals feed on plants. As population soars, so do demands on the plant world. We need more foods, fibers, and drugs, and these can be developed only by botanists in their researches on vegetable organisms."

Mr. Everett continued: "Botanical gardens serve three major purposes: dissemination of knowledge through lectures, publications, and plant displays; preservation of knowledge through herbariums and libraries; search for knowledge through research by botanists and horticulturists."

Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Research, served on an ad hoc committee to select a curator of economic botany for Harvard University. Dr. Maguire will attend the proposed second Tropical Botanical Conference to be held in Trinidad probably from July 1 through 7, 1962. The Congress is particularly concerned with developing communications and encouraging an interchange of students, researchers, and professors.

Dr. David J. Rogers returned the fore part of March from a two-month field operation in South America on *Manihot esculenta* and allied species under a grant from the National Science Foundation. He will deliver a paper on the origin and distribution of *M. esculenta* and allied species at the meetings of the American Institute of Biological Sciences to be held at Corvallis, Oregon, on August 26-30, 1962. Dr. Rogers recently conferred with Dr. David D. Keck and Dr. Walter H. Hodge at the National Science Foundation. Dr. Keck, a former member of the Garden's staff, now holds the position of Deputy Assistant Director of the Division of Biological and Medical Sciences; Dr. Hodge, formerly Director of Education at Longwood Gardens, is now consultant in tropical botany in the Division.

Dr. Arthur Cronquist, Curator, is making minor corrections in his book *Introductory Botany*, preparatory to its second printing. His manual based on Britton and Brown's Flora is now in press and will be published by Van Nostrand presumably this year. Dr. Cronquist is continuing his work on the Northwest Flora and the Intermountain Flora of the United States, and is projecting a two-month field trip to Mexico in the fall, mainly to study *Compositae*. He will give seminars at several summer institutes: for two weeks in June at the Eastern New Mexico University Institute for High School Teachers in Biology, and for a week in July at the Summer Institute on Plant Taxonomy and Evolution at Vanderbilt University, Nashville, Tennessee. Dr. Cronquist has been invited to give a major paper at the International Conference on Taxonomic Biochemistry, Physiology, and Serology at the University of Kansas, September 4-6, 1962. He will attend the meetings of the American Institute of Biological Sciences at Corvallis, Oregon, and as President of the American Society of Plant Taxonomists will give an address before the Society and lead a field trip in the Cascades.

Dr. Herman F. Becker, Research Associate, will leave the middle of June to collect plant fossils at several new sites in the Ruby and Grasshopper Basins of southwestern Montana. After the field work, Dr. Becker will attend the meetings of the American Institute of Biological Sciences at Corvallis, Oregon, and will present a paper on the "Mesozoic Flora of Maktesh-Ramon in the Negev Desert" for Dr. Jacob Lorch of the Hebrew University in Jerusalem, Israel. Part of Dr. Lorch's paper consists of findings Dr. Becker made in that area during the summer of 1960.

E. J. Alexander, Associate Curator, at the request of the management of the 1961 International Flower Show served as a judge for the cactus and succulent exhibits for the fifth consecutive year; and at the request of the Horticultural Society of New York, served in its Information Center at this show during the evenings. He has done this for a number of years. Mr. Alexander recently lectured before The Working Gardeners of Bronxville at the Village Library in Bronxville, New York.

Dr. Eugene Jablonski, Honorary Curator of Tropical Botany, with the assistance of Louis P. Politi, Horticulturist, has completed and given to the Garden a folio of maps and charts of the Thompson Memorial Rock Garden.

Dorothy Ebel Hansell, Editor of *The Garden Journal*, Henry Fleming, Research Associate, and Mary Fleming, Technical Assistant, will attend the annual meeting of the American Rhododendron Society to be held at Winterthur, Delaware, and Longwood Gardens, Kennett Square, Pennsylvania, on May 6 and 7, 1962. Members and friends attending the meeting will be guests of Henry F. du Pont at dinner on the first evening. Mr. du Pont is a member of the Board of Managers of The New York Botanical Garden.

Mrs. Hansell and Elizabeth C. Hall, Sarah Gildersleeve Fife Research Librarian, will attend the annual meeting of the Herb Society of America to be held May 13-16, 1962, in and around Washington, D. C. The exciting four-day program includes an exhibit, tours to herb gardens in Alexandria and Georgetown, to Woodlawn, Mt. Vernon, and Dumbarton Oaks, and lectures. One of the lectures will be given by Dr. Emily Emmart, currently associated with the National Institutes of Health, on the Badeanus Herbal, 1552, which she translated from a manuscript in Latin found in the Vatican. This herbal, the only Aztec one in existence, is considered to be the earliest on medical history in the New World. The other lecture will be delivered by Dr. Llewellyn Williams, Senior Botanist with the Crops Research Division of the United States Department of Agriculture. His subject will be "Over the Andes and Down the Amazon," an area in which he collected plants on seven expeditions.

Barbara Bloswick joined the Garden in mid-February as Research Assistant to Dr. Alma Barksdale, Senior Research Associate, and Dr. George Bistis, Research Associate, in the Research Laboratory.

Staff Seminars. A. Clayton Scribner gave an illustrated talk on "The Flora of Newfoundland" at the staff seminar on March 1, 1962. At the staff seminar on April 5, 1962, Dr. Carl L. Withner of the Department of Biology, Brooklyn College, talked on "Orchid Collecting Around the Pacific." At the seminar on May 10, 1962, Dr. Alma W. Barksdale, Senior Research Associate, spoke on "Our Year in Japan."

Children's Gardencraft Program. One hundred and fifty young people between the ages of nine and sixteen gathered at the Garden on March 17 for the opening of the 1962

Children's Gardencraft Program, in which instruction is given in planning, planting, and caring for a garden plot under the supervision of Mrs. Lillian Weber.

The students are introduced to gardening in several indoor sessions before they move to the garden plots where they will grow vegetables and flowers. They work in pairs on plots 6′ × 15′, and the crops include carrots, beets, broccoli, spinach, peppers, lettuce, radishes, scallions, beans, tomatoes, and marigolds and zinnias. The advanced students, working on a trial plot, also grow corn, eggplant, cucumbers, squash, and tomatoes.

Until the end of the school term, these young gardeners meet every Saturday morning, then on week days through late August. Those who complete the course with satisfactory grades receive certificates. The certificates are presented at graduation exercises in which several staff members participate. Book prizes are awarded for the best work from a fund set up for the purpose by a member of the Garden.

Fifty young people entered the first class in this popular course at The New York Botanical Garden six years ago. Each year the enrollment has increased. The 1961 class of 125 pupils raised several tons of vegetables.

Outdoor Walks at the Garden. Something new has been offered visitors at The New York Botanical Garden this spring. Howard W. Swift, Assistant Curator of Education, has been conducting walks on six consecutive Saturday afternoons, April 7 through May 12, so that visitors may become better acquainted with plants grown at the Garden. Emphasis has been placed on evergreen trees, early-flowering shrubs, evergreen shrubs, deciduous trees in spring, mid-spring–flowering shrubs, and spring-flowering perennials and bulbs.

The walks have begun promptly at one o'clock so that any one who wished could attend the Free Saturday Afternoon Program in the Auditorium of The Museum Building at 3:00 p.m.

The Garden's Exhibit at the International Flower Show in the Coliseum, New York City, featured a collection of plants that are natives of or are cultivated in warm, humid regions. The plants were arranged in a setting to simulate a naturalistic tropical garden. The "rock" used in the exhibit was limestone slag, a by-product of iron smelting, weathered for several years. The effect of depth and distance beneath the waterfall was obtained by a tilted mirror, at the rear of the grotto, which reflected the pool.

The exhibit, designed by Louis P. Politi, Horticulturist, and erected by him and the employees of the Gardening Department, reflected credit upon The New York Botanical Garden. The exhibit was awarded the "Best in Show" trophy, the award for the best pool garden, and the Bulkley Medal of the Garden Club of America.

Tropical plants are not hardy in the New York area, but many serve well as indoor decorative plants—begonias, bromeliads, gesneriads, dracaenas, philodendrons, dieffenbachias, orchids. Many fine specimens of these and other plants were included in the exhibit, and the Garden's Conservatory houses a large and varied collection of tropical and subtropical plants.

The Beds of Caladiums near the main entrance to The New York Botanical Garden made a colorful display from early summer until frost during 1960 and 1961. The several thousand bulbs were presented to the Garden by Florence B. Krukoff, Director of Ensayos Agricolas, S. A., Chicacao, Guatamala, Central America.

The bulbs were started indoors the middle of March, planted in the beds in mid-May, and lifted in late September.

Trees Magazine, published by Edward Scanlon and Associates of Olmsted Falls, Ohio, recently celebrated its twenty-fifth anniversary. Of the 308 authors, Dr. P. P. Pirone, Plant Pathologist of The New York Botanical Garden, and Dr. L. C. Chadwick, Chairman of the Department of Horticulture at Ohio University, headed the list with thirteen articles each during the past quarter of a century.

The New York Botanical Garden exhibit at the International Flower Show.

Stanley J. Smith, Curator of the Herbarium, New York State Museum, Albany, spent three days at The New York Botanical Garden, checking references and specimens for his "Checklist of the Grasses of New York State."

Dr. Edward J. Duda was appointed Director of the Bartlett Tree Research Laboratories, at Stamford, Connecticut, in April, 1962. He joined the Laboratories' staff in 1951, became chief entomologist in 1957, and has been acting Director since 1960. Dr. Duda is a member of the Entomological Society of America, the Connecticut Entomological Society, the International Shade Tree Conference, the Connecticut Tree Protective Association, and secretary-treasurer and member of the executive committee of the Northeastern Forest Pest Council.

The Laboratories are devoted to research into fundamental problems of entomology, pathology and physiology that affect shade and ornamental trees and shrubs.

Visitors to the Garden.

Dr. Hans Georg Peg, Berlin, Germany.

Carl Fenninger, American Association of Botanic Gardens and Arboretums, Philadelphia.

Dr. José Cuatracasas, U. S. National Herbarium, Smithsonian Institution, Washington, D. C.

C. Edward Scofield, Ra-pid-Gro Corp., Dansville, N. Y.

Dr. Edward T. Broune Jr., University of Kentucky, Lexington, Ky.

Dr. George S. Bunting, Jr., Bailey Hortorium, Cornell University, Ithaca, N. Y.

Dr. Robert T. Clausen, Department of Botany, Cornell University, Ithaca, N. Y.

Dr. Harold H. Clum, Hunter College, New York, N. Y.

Mrs. Claude Weber, Arnold Arboretum, Cambridge, Mass.

J. Harry Lehr, Spring Valley, N. Y.

Dr. William Bridge Cooke, Public Health Service, Cincinnati, O.

Dr. and Mrs. Rolla M. Tryon, Gray Herbarium, Harvard University, Cambridge, Mass.

Dr. Howard E. Bigelow, Dr. Margaret E. Barr Bigelow, Department of Botany, University of Massachusetts, Amherst, Mass.

Rex H. Murfit, Stonecroft Nursery, Cold Spring, N. Y.

S. Kurokawa, Smithsonian Institution, Washington, D. C. (Res. Inst., Natl. Resources, Tokyo)

Dr. John Wurdack, U. S. National Herbarium, Smithsonian Institution, Washington, D. C.

Dr. R. W. Richards, Dr. A. J. Birch's Laboratory, Manchester, England.

BOOK REVIEWS (Continued from page 116)

set in the earlier parts is maintained, as is the scholarly reappraisal of all taxa with generally satisfactory results. Mrs. Janish's excellent line drawings of each species add greatly to the usefulness of this valuable work.

DAVID D. KECK
Deputy Assistant Director for Biological and Medical Sciences
National Science Foundation

CHROMOSOME NUMBERS OF CENTRAL AND NORTHWEST EUROPEAN PLANT SPECIES. Askel Löve and Doris Löve. 581 pages. Opera Botanica Vol. 5. Lund, Sweden. 1961. $7.85.

This truly monumental work, nineteen years in preparation, is indeed a valuable addition to the existing compilations of chromosome numbers for the world's plants. As botanists increase their understanding of the importance and significance of chromosome numbers and as new numbers are reported in unabating crescendo, the need for catalogs more restricted in geographical scope and more exhaustive in coverage has become critical. It may be hoped that this book, concerned with a region from which the greatest fund of cytological information has come, will serve as a stimulus and model for similar endeavors in other regions. It may also be hoped that this catalog will be provided with periodical supplements as more knowledge is gained, rather in the manner of the more comprehensive but less intensive work of Cave et al.

The geographical area covered by the manual is roughly pentagonal in form, the angles marked by Iceland, Spitsbergen, Varanger Halvøya (northeastern Norway), Liechtenstein, and the United Kingdom. The list includes 6850 taxa of vascular plants at or immediately below the species level. Few varieties are given but in certain genera, e.g. *Ranunculus, Rubus, Alchemilla, Hieracium,* and *Taraxacum,* apomicts ("agamospecies" of the authors) are listed.

The arrangement of families is essentially Englerian, with some deviations below the Dicotyledons. The authors state that the arrangement of genera within a family "follows recent practice," and that the arrangement of species within a genus "usually follows some of the manuals or check lists used as a basis for the list of categories." In consideration of the reference nature of the work, it would facilitate more ready use, especially in the larger families and genera, had the generic and specific listings been made alphabetically.

An exceedingly useful adjunct to this catalog is the enormous bibliography of cytological publications, nearly two hundred pages long and containing over forty-five hundred entries. An index of families and genera concludes the work, a most welcome and practical tool for cytologist, geneticist, and taxonomist.

HOWARD S. IRWIN

LOWER UPPER CRETACEOUS PLANT MICROFOSSILS FROM MINNESOTA. Pierce, Richard L. Minnesota Geological Survey Bull. 42, xl and 86 pages, illustrated, indexed. University of Minnesota Press, Minneapolis, Minn. 1961. $3.75.

This highly technical paper describes a pollen profile from the Cenomanian in eastern, south-central, and southern Minnesota. It is suggested that the transgression of the Benton and Niobrara seas facilitated dispersal of angiosperms into suitable environments, but that this flora differed from typical post-Eocene "modern" floras, and that it may not be profitably correlated with recent plant associations. The floral expression of this Cretaceous assemblage suggests analogy with warm-temperate coniferous rain forests of the Pacific Northwest or the east

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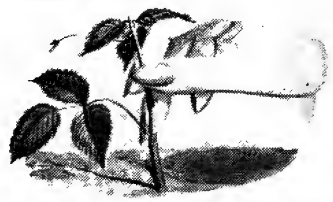

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coast of Asia, which is in disagreement with R. W. Chaney's subtropical evergreen angiosperm associations for the Dakota floras.

The palynologist will find this paper a useful guide to procedures in the field, to interpretations of collected material, and its correlative application toward a better understanding of early angiosperm expansion. Palynological nomenclature and taxonomy, subject to competitive dominance by at least three "schools," has a hard road to travel to complement reasonably and successfully the work done in macropaleobotany.

HERMAN F. BECKER

TRANSLOCATION IN PLANTS. Crafts, A. S. x + 182 pp. Illustrated, indexed. Holt, Rinehart and Winston, New York. 1961. $5.00.

COMPARATIVE PLANT ANATOMY. Carlquist, S. x + 146 pp. Illustrated, indexed. Holt, Rinehart and Winston, New York. 1961. $5.00.

Holt, Rinehart and Winston have initiated a series of "Biology Study Books" designed to inform the advanced undergraduate and beginning graduate student of the current status of the field covered by the individual volume. Eight titles, four of them strictly botanical, have been prepared to date. The authors are all well-known scientists, and the series promises to be of value. It is unfortunate, however, that the publishers have placed the price so high and have bound the books in hard covers rather than in paper. In doing so, the inexperienced student will feel that this is the "last word" on a given subject rather than being, as all scientific writing must be, a progress report.

There is no particular advantage in discussing the two volumes under consideration. Both are extremely well organized, written, illustrated, and indexed. Prof. Crafts has prepared a comprehensive book on translocation; Prof. Carlquist has done equally well. Both books can be read with profit by all botanists.

RICHARD M. KLEIN

BACTERIAL PLANT PATHOGENS. Stapp, C. Translated by A. Schoenfeld. 292 pages, illustrated, indexed. Oxford University Press. New York, N. Y. 1961. $6.75.

This is an authorized translation by A. Schoenfeld of C. Stapp's *Phlanzenpathogene Bacteria*, originally published in Germany in 1958. Techniques required for the identification of bacterial plant pathogens are described in the first part, and the principal genera and important species are described in the second part. Control measures are also included for each species discussed. An extensive list of references after each species further enhances the value of this well-made book. Stapp's nomenclature differs somewhat from W. J. Dowson in his 1957 edition of *Plant Diseases Due to Bacteria*. For example, he places the crown gall organism in the genus *Agrobacterium*, whereas Dowson moves it to the genus *Erwinia*.

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ADVANCES IN PEST CONTROL RESEARCH. Vol. III. Edited by R. L. Metcalf. 448 pages, illustrated, indexed. Interscience Publishers, Inc. New York. 1960. $14.50.

This volume consists of a comprehensive review and critical evaluation of current research in nine areas of pest control. Emphasis is placed on fundamental aspects of the problem. Each subject is covered by a specialist and written for the individual with a training in chemistry and biology.

DAVID DAVIS

PHENOLICS IN PLANTS IN HEALTH AND DISEASE. Edited by J. B. Pridham. 131 pages, illustrated. Pergamon Press, New York. 1960. $7.50.

This book covers the Proceedings of a Plant Phenolics Group Symposium held at Bristol, England, in April, 1959. The role of phenolics in plant lignification, plant pathology, and plant genetics are the three major topics dealt with in this volume. In addition, an introductory chapter contains papers on other aspects of plant phenolics.

DAVID DAVIS

HOST INFLUENCE ON PARASITE PHYSIOLOGY. Stauber, Leslie A. (ed.) 96 pages, illustrated. Rutgers University Press, New Brunswick, N. J. 1960. $2.00.

This volume is composed of six papers, presented at the sixteenth Annual Conference of the Bureau of Biological Research, that deal exclusively with animal diseases caused by animal parasites.

DAVID DAVIS

MUSHROOMS AND TRUFFLES. Singer R. xxiii + 272 pages, illustrated, indexed. 32 plates (3 colored). Interscience Division, John Wiley & Sons, Inc., New York. 1962. $10.25.

In this book Dr. Singer has brought together up-to-date information on the interesting aspects of the cultivation of mushrooms and truffles as food crops throughout the world. A general chapter deals with classification, biology, morphology, and cytology of mushrooms. The botany and cultivation of *Agaricus bisporus*, the only commercially grown mushroom in the United States, is presented in considerable detail. The padi straw mushroom and its cultivation in the tropics, the shiitake and its cultivation in east Asia, truffles and their cultivation in France, and the potential cultivation of other mushroom species are discussed. Diseases, pests, and weed fungi are considered. Finally, the utilization for human consumption and food value of mushrooms are summarized.

The book, one of the World Crop Series edited by N. Polunin, can be highly recommended.

CLARK T. ROGERSON

Japanese Medicinal Plants, Vol. I and II, by Koiti Kimura, published in Tokyo by the Hirokawa Publishing Co., in 1958 and 1960, respectively, have just reached us. The two books, attractively bound in board, total about two hundred and fifty pages, of which almost half consist of 241 beautifully colored illustrations, each 3.5 × 5.5 inches in size. The text is in Japanese, but the plant families, scientific plant names, and Japanese vernacular names are also in English. Thus we know that *Hamamelis japonica* Siebold and Zuccarini belongs to the *Hamamelidaceae* and in Japan is known as "mansaku." Though the text is "Greek" to us, the interspersed drug names are in English. The

spelling is at times faulty, because of typographical errors, but these last are too trivial to cause confusion. The most international script—and we decry the use of Latin for the description of plant novelties—is a good illustration, and Dr. Kimura, Professor of Pharmacology and Pharmaceutical Botany, Kyoto University, has produced a work that will not only delight and interest the reader of Japanese, but will delight the reader of any language. Study of Dr. Kimura's plates should convince the skeptic that in the geologic past there flourished a rather uniform circumpolar flora—so many of the genera found in Japan are the same as those represented in the eastern United States.

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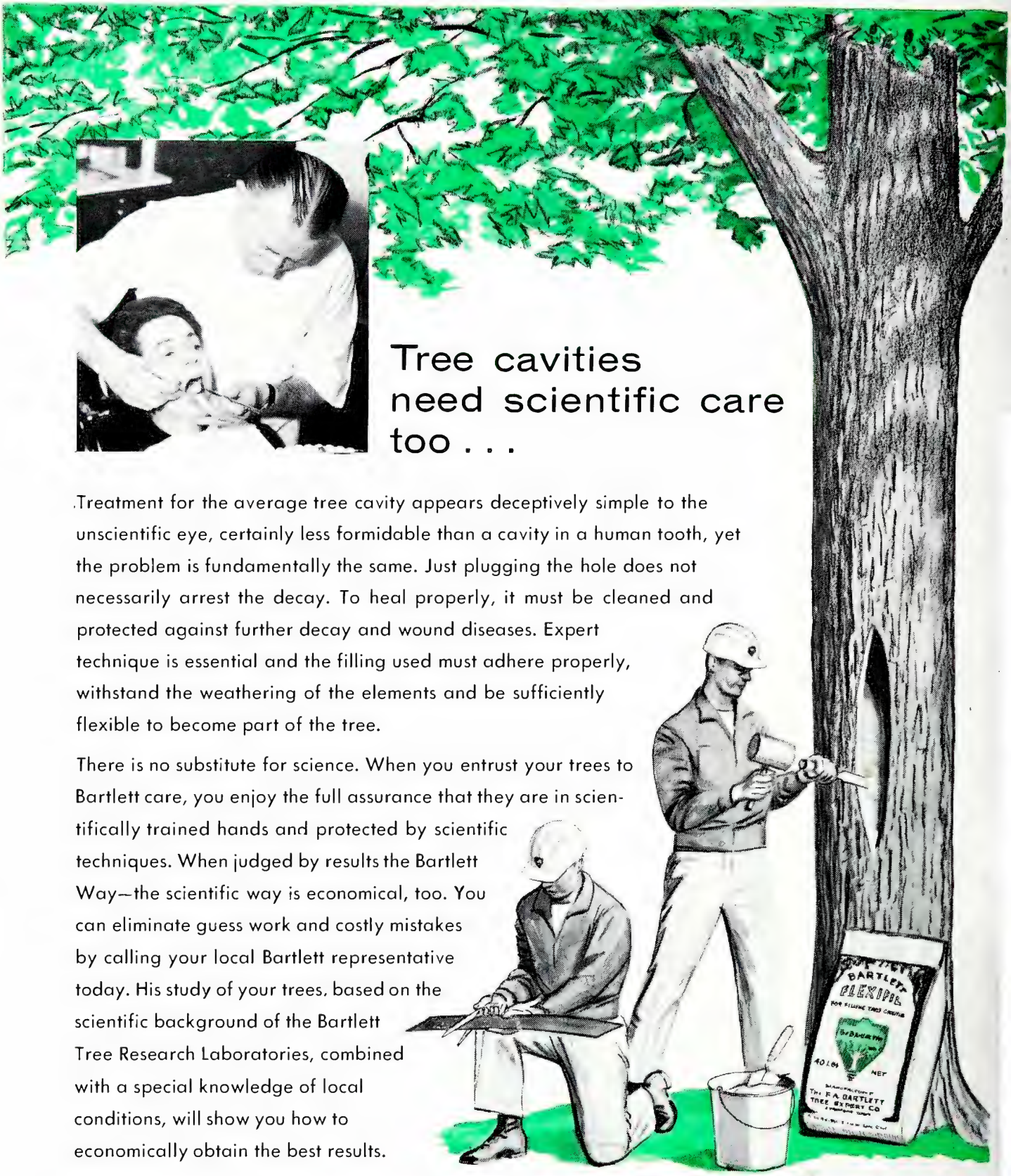

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THE NEW YORK BOTANICAL GARDEN

DOROTHY EBEL HANSELL
Editor

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CALENDAR

August 31 - September 8, 1962. Sixteenth International Horticultural Congress, Brussels, Belgium.

October 27, 28, 1962. Nineteenth Annual Show of the National Chrysanthemum Society, U.S.A., Inc., and Seventh Annual Show of Potomac Chrysanthemum Society, Shoreham Hotel, Washington, D. C.

December 6, 1962. Holiday House Tour in New York, N. Y., sponsored by The Volunteer Associates of The New York Botanical Garden.

January 10, 17, 24, and 31, 1963. Downtown Lecture Series, sponsored by The Volunteer Associates of The New York Botanical Garden.

March 19 - 20, 1963. International Flower Show, City Hall, Cape Town, celebrating the "Golden Jubilee" of the National Botanic Gardens of South Africa, Kirstenbosch.

April 26 - October 13, 1963. International Horticultural Exposition, Hamburg, West Germany.

May 6, 1963. Annual Meeting of The New York Botanical Garden.

June 8, 1963. Twenty-first Annual Rose Day at The New York Botanical Garden.

CREDIT FOR ILLUSTRATIONS

We are indebted to the Display Committee, Mrs. Charles Burlingham, Chairman, for the selection of the front cover illustration — the passion-flower, **Passiflora alatus-caerulea**, photographed by Walter Singer in the Conservatory of The New York Botanical Garden, and shown in "Photography at Mid-Century," the 1959-1960 exhibit commemorating the tenth anniversary of the George Eastman House. Rochester, N.Y.; inside front cover, the Rose Garden at The New York Botanical Garden, Gottscho-Schleisner; pp. 121-123, Quattlebaum Studio,—courtesy June R. Henderson; pp. 125, 126, Charles C. Clare, Jr.; pp. 129-132, Stuart Dunn; p 135, Library, The New York Botanical Garden; p. 137, Sanwa Bank, Ltd.; pp. 140-143, J. S. Womersley, Botanic Garden at Lae; pp. 145-147, Pierre Dansereau; pp. 150-155, Walter Singer.

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Camellia japonica 'Drama Girl', semidouble form, rose-pink color. This bloom, grown in the open, measured seven inches across.

THE CAMELLIA
SOMETHING OF THE SPECIES AND VARIETIES

By JUNE R. HENDERSON

Mrs. P. F. Henderson is a member of the Sand Hills Garden Club of Augusta, Georgia. A few years ago she received, through her club, The Garden Club of America Horticultural Committee Award. Recently that organization presented to her the Bronze Medal of Merit for her work in horticulture.

THE GENUS *Camellia*, in its species and varieties, becomes more popular each year because of the magnificence of its blooms as well as its value as an evergreen. Also, the greater popularity of the camellia has followed the greater knowledge of its culture. With the revival of interest in the cultivation of this oriental exotic, which began in this country perhaps thirty-five years ago, gardeners have become more familiar with its requirements. It is now known that given a favorable location, which means a greenhouse for some species, with protection from wind, soil on the acid side, ordinary care in watering, spraying, and pruning, this handsome shrub will respond in an obliging way.

The history of the camellia is a romantic and interesting story. It tells of sailing vessels and adventurous explorers, who went to the Orient in quest of the riches of that fabulous land. Fortunately for gardens during the past two hundred years, some of the men aboard those ships were plant hunters who were interested in the natural life of China and other countries of the East. They found much material which they felt would enrich their home gardens. With great difficulty they were able to keep only a part of their collections alive on the return journeys to their native lands.

Some of these travelers saw and reported species of the camellia. As early as 1712 Kaempfer wrote of a visit he made to Japan and mentioned *Camellia japonica*, which he called by the Japanese name of San-sa Tsubaki. Other explorers during the first half of the eighteenth century saw and named the species *C. sinensis* and *C. sasanqua*. A century later Captain Rawes brought a beautiful variety of *Camellia reticulata* to England, which to this day bears his name.

During the last half of the eighteenth century the camellia, which had been named by Linnaeus for a Jesuit priest Georges Joseph Kamel, was grown in England as well as in France, Italy, Portugal, and other countries on the European continent. Not only was there great enthusiasm for the cultivation of this newcomer from the Orient, but many volumes, some beautifully illustrated, were written about it, giving dates of introductions and descriptions. One of

earliest illustrations of the camellia is to be found in *A Natural History of Birds,* Volume II, by George Edwards. It depicts a peacock pheasant perched on a branch of a camellia on which are three semidouble pink blooms. The artist wrote in the descriptive text: "This beautiful flowering tree was raised by the late curious and noble Lord Petre." At the bottom of the plate — "Published December 1745 by G. Edwards."

The popularity of this flower continued into the nineteenth century. Nurseries increased their output of varieties by raising seedlings and by the propagation of sports. Curtis' *Monograph on the Genus Camellia*, which was published in London in 1819, described twenty-one varieties. Clara Maria Pope illustrated this volume with five large beautifully colored plates. In 1825, *Camellia Brittannica* made its appearance. Plates 1 and 2 portrayed *Camellia chandleri* which was originated by M. Chandler in 1819. The legend states, "This being the most prized is named for M. Chandler." This lovely variety of *C. japonica* is popular with growers today. Another variety, *C. japonica* var. *donckelari,* which was brought to Belgium from China in 1830 by van Siebold, has also maintained its popularity to the present time. This is true not only because of its interesting semidouble form and beautiful color, but because it is the progenitor of some splendid seedlings and the producer of some outstanding sports.

The camellia followed in the wake of trade and travel to the new country. It is said that late in the eighteenth century, after the colonies had separated from the mother country, John Stevens of Hoboken, New Jersey, received the first *Camellia japonica* from Europe for his nursery. For more than a century ardent plant hunters from England and other European countries had eagerly sought new plants in the American colonies. It was felt that trees from the new country would be valuable additions to the royal plantations of France. André Michaux was commissioned by his government to go to America and to send home those things that he considered most valuable.

Michaux traveled along the eastern seaboard from 1785

Camellia reticulata 'Captain Rawes', semidouble form with irregular petals, carmine-rose-pink.

Camellia japonica var. *mathotiana*, very large rose form, crimson color; the parent of several hybrids.

until the dawn of the next century. To this famous botanist and plantsman is accorded the credit for bringing *Camellia japonica* to Charleston, South Carolina, where the climate was suitable for growing the plant in the open. There it has flourished magnificently ever since and, in large measure, has contributed to the fame of Middleton, Magnolia, and other beautiful gardens in that area.

After the middle of the nineteenth century interest in the camellia, which had been so fervent for a hundred years, slipped away. Apparently the flowers cultivated at that time were formal types, and perhaps they were not exciting enough to hold the attention of growers. However, many of the earlier plantings have survived. Some wonderful old camellia bushes can still be found in gardens throughout the southeastern states — telling evidence of the devotion that people of an earlier century bore for this flower.

After the first World War there was a revival of interest in the cultivation of camellias. In the early 1930's the Sand Hills Garden Club of Augusta, Georgia, staged a camellia show which was one of the first shows of this one flower ever held. It stimulated interest not only in growing camellias but also in staging more shows. During the intervening years since that first occasion, camellia shows have become important horticultural, civic, and social events in cities and towns throughout the southeastern states. These states, particularly those that border the Gulf of Mexico and the Atlantic Ocean as far north as Maryland, are known as the "Camellia Belt." In them this Oriental exotic thrives out-of-doors, because growing conditions are much like those in its native habitat. Even though a heavy frost is devastating to open flowers, a few days of sunshine will bring more bloom.

The enthusiasm for the culture of the camellia in the past twenty-five years is really of sociological interest. It is significant in many respects. Nurseries are devoted entirely to growing and selling plants of this one genus.

There were as many theories of cultivating, fertilizing, and spraying as there were growers. As to nomenclature, the situation was almost hopeless; there were frequently several names for one variety. Fortunately, two very fine organizations have developed into real forces and now function in an effective way in the camellia world. These are the American Camellia Society and the Southern California Camellia Society. The former, organized in 1945, has a large membership not only in the South but in other parts of the country as well. In addition to holding an annual meeting, the Society sends out two very fine publications, *The Camellia Journal*, a magazine which is issued four times annually, and *The American Camellia Yearbook*, which goes to members of the Society at the end of each year.

Every two years the Southern California Camellia Society issues a publication entitled *Camellia Nomenclature.* The value of this handbook cannot be overestimated, for without the information contained therein, it would be almost impossible to stage the shows which at the present time are made up of many, many varieties. The 1962 edition is larger and carries more information than any of its predecessors. The Research Committee has made great strides in working for an International Code of Nomenclature. It has made rules for the classification and description of varieties. Its division of flower forms is based on one laid down by the Abbé Berlèse in France in 1838. Camellias, according to form, fall into six classes: single, semidouble, anemone form, peony form, rose form double, and formal double. When camellia shows were first held, the flowers were classed according to form, but with the rapid increase in number of varieties this is no longer possible. Sets of varietal cards are an important part of camellia show properties, and the American Camellia Society recommends that blooms be arranged according to variety in alphabetical order. The Society further recommends: "All blooms with synonymous names shall be exhibited as representative of one variety."

The American Camellia Society agreed to accept names, spelling, and descriptions of varieties as listed in *The Camellia, Its Culture and Nomenclature.* In addition to the long list of varieties of *C. japonica,* other species are also listed. Although more than half a hundred are known, comparatively few are grown in this country. Among them are *C. sasanqua, C. reticulata, C. honkongensis, C. maliflora, C. sinensis, C. oleifera, C. saluenensis,* and *C. granthamiana.* Some of these will flourish only in greenhouses, while others will grow out-of-doors in rather cold climates.

Camellia sasanqua qualifies as an adaptable shrub and one that can withstand some extremes of weather. In addition to its cold-hardiness, it has other characteristics to recommend it. It is quite disease-resistant and will tolerate more rugged growing conditions than some other species. While the flowers of sasanquas are not large or spectacular, they begin opening early in the autumn, and they have a lovely range of color from pure white through all the shades of pink to red. The varieties longest grown are *rosea* and 'Mino-no-yuki' (Snow-on-the-Mountain or White Doves). Some of the sasanquas have a lovely fragrance; this quality is more pronounced in some varieties than in others. The blossoms are not satisfactory as cut flowers, since they shatter very easily. However, the shrubs in full bloom, whether used separately for landscape or in hedges, make a beautiful display. Because of its many desirable characteristics, *Camellia sasanqua* is constantly increasing in popularity.

Varied both in color and form, in contrast to the flowers of *Camellia sasanqua*, are the very large flowers of *C. reticulata.* The first variety of this species to be grown in either Europe or this country was 'Captain Rawes'. Gorgeous is the adjective that describes this flower, which some critics consider the most beautiful of all camellias, unsurpassed in form and color by later varieties of the species.

As a result of importations of reticulatas in 1948 from the Kumming District of China, where they were discovered, interest in this species is now widespread. The names of the varieties are intriguing. Some are in Chinese, while others, in English, are descriptive of the flower. Like other prima-donnas, reticulatas require special conditions for their performances. In the southeast camellia belt, they do not grow in the open; they flower only in greenhouses. Neither will they root from cuttings, but they appear to graft very well on the stock of other species. There are some reports of a few varieties which set seed.

In the 1960 *Rhododendron and Camellia Yearbook* of

(Continued on page 138)

Camellia japonica 'Herme', the parent of many fine seedlings and sports; semidouble form, its pink petals streaked with white and deep pink.

Camellia japonica 'Pearl Maxwell', large, formal, double form, soft shell-pink color; looks like a glorified 'Pink Perfection'.

MOSSES — OUR UNSEEN FRIENDS

By Edwin H. Ketchledge

Dr. Ketchledge is Assistant Professor of Forest Botany, State University College of Forestry at Syracuse University, Syracuse. New York. He was a student of Dr. William C. Steere, Director of The New York Botanical Garden, when Dr. Steere was Dean of the Graduate School at Stanford University in California. The following has been adapted from the original article that appeared in *The Conservationist,* June-July 1961, published by the State of New York Conservation Department.

To the naturalist one of the joys of a field trip is seeing familiar plants and animals and becoming acquainted with new ones. We all feel more at home in the fields and woods when we recognize the plants and animals around us. As our association with them increases over the years, plants and animals acquire a measure of personality. We learn to recognize them as distinct species with characteristics of their own. Each species of tree, each species of fern, we learn to associate with certain natural habitats. We become aware of their environmental relationships. Yet how often we step upon, walk over, or pass by the mosses! They are there, on rock, tree, or log, giving color to outdoor scenes, but we are not consciously aware of them. We share their homes, yet do not make their acquaintance or learn their kinds. To most of us they remain "unseen."

Why may we call mosses our "friends?" Because they play such an important role in the balance of nature. Unlike most higher plants, mosses are of nearly universal occurrence in plant communities. Although inconspicuous, they perform essential functions in maintaining the health and vigor of wildland habitats and thus indirectly serve man.

Let us, then, examine the mosses and see what they are and what they do. They are specialists in frugality. They make little demand upon their surroundings. Given a little room, a little light, and water, mosses will grow in habitats too severe for the more demanding higher plants. Four species of moss, for example, even occur on the wet rocks near light bulbs deep below ground in Howe Caverns! Because their ecological requirements are meager, mosses may be the only inhabitants of such extreme habitats as rocky waterfalls or clay banks. Only lichens exceed the mosses in ecological vigor and ability to invade bare areas virgin of vegetation. During periods of drought, mosses simply dry up and remain dormant, only to renew their growth unimpaired when rains again moisten the landscape. With this competitive advantage, mosses pioneer new habitats and, with the lichens, initiate the waves of plant succession whereby vegetation is established on bare sites or renewed on wasted land. Whether in bog or meadow or woodland, mosses help pave the way in the development of permanent communities.

Although pioneer mosses are eventually replaced by higher plants, other species of moss flourish within the mature forest stand. Indeed, the cool, moist conditions characteristic of shady woods are especially favorable to a great array of mosses. There each species occupies a small environmental niche to which it is highly adapted. Some occur only on the lower trunks of hardwood trees, others only on partially decayed logs and stumps, still others on the forest floor. Each clothes its habitats with a protective green cover. Collectively mosses thus help to stabilize the community, protecting the ground from erosion, providing beds for forest tree seeds, carpeting dead wood, and speeding the decay processes essential for a healthy forest. Although small in size, mosses play a fundamental role in the balance of nature.

Save for a few algae, mosses are the most primitive type of terrestrial green plant. They were probably among the first plants to appear upon the face of the earth during the great landward migration of the Devonian period, over three hundred and fifty million years ago. Because of their delicate tissues, however, mosses are poorly represented in the early fossil record. By contrast, fossilized mosses are quite abundant in Pleistocene ice-age deposits. These recent fossils, dating less than one million years in age, are very interesting because many of the species are identical with modern, living mosses. During their long geologic history, mosses have undergone little evolutionary change. As a group they thus constitute a "blind alley," a relic from prehistoric times.

In structure, mosses are the essence of simplicity. As is true also of ferns and other lower forms of plant life, mosses reproduce by spores, not by seeds. Upon germination the spores produce alga-like threads or filaments, called the protonema, which spread over the ground. It is from "buds" scattered along the protonema that the leafy, green moss plant arises. Mosses lack roots; they are anchored to the ground by numerous microscopic threads called rhizoids. Viewed with a hand-lens or magnifying glass, the delicate shoots of moss are seen to consist of only two parts: a simple erect or creeping prostrate stem and many small, thin leaves. The leaves are simple sheets of green cells, mostly one layer thick, devoid of specialized conducting or strengthening tissues. Along the stem or at the tip of the shoot, the reproductive cells are located. After fertilization a small capsule of spores appears, usually elevated above the leafy shoot on a short stalk. Here, exposed to the passing air currents, spores are released from a pore at the end of the capsule. Actually, the spore-releasing mechanism is relatively complex and serves the bryologist as an important means of classifying the various species. Most mosses also reproduce by vegetative multiplication. One must marvel at their efficiency!

The variety of mosses in New York is quite impressive. Over four hundred and fifty species occur within the political confines of the State. The number is about equally divided between northern species, many of which also occur in Europe and Asia, and southern species characteristic

Plume moss

Grain-of-wheat moss

Mountain fern moss

of the temperate zone. Many species exhibit wide ecological tolerances and are thus relatively common in all sections of the State. A number of species occur in New York solely as outliners of subtropical or of Arctic ranges. A few are known from only one or two locations. Moreover, because of special habitat requirements, some species may be frequent in one part of the State but absent from others. Within any particular geographical region, of course, a moss may be limited in local distribution according to its unique habitat needs; the knothole moss, *Anacamptodon splachnoides,* is found only in the knotholes and forks of deciduous trees, especially maples, and the red umbrella moss, *Splachnum rubrum,* grows only on partially decayed animal droppings. Because so many mosses are restricted to particular habitats, the well-trained bryologist can often predict what species will be found at a particular spot or in a particular ecological situation.

Peat Mosses

Mosses may be classified into two types: peat mosses and true mosses. The peat mosses belong to a single genus, *Sphagnum.* Although the various species of *Sphagnum* are distinguished only with difficulty, peat mosses as a group are easily recognized in the field. They are confined to bogs, swamps, wet depressions in the landscape, or springy places with abundant water. Sphagnum generally forms dense tufts or mats many feet across, with the individual stems crowded together so that each is held upright. The shoots may be nearly a foot tall, but only the upper portion is green and living. In most species the main stem is undivided. Clumps or whorls of dwarf branches, however, are spirally arranged along the main stem. Near the apex of the shoot the dwarf branches, each about half an inch long, are densely crowded and either erect or spreading: in contrast, the clusters of small branches further down the stem tend to droop, often giving the plant a wilted appearance. Capsules, when present, are borne on short stalks arising near the tip of the leafy shoot. Unfortunately, one of the most distinctive features of sphagnum, namely the large, colorless, water-retaining cells in the leaves and stems, is not apparent with the hand-lens.

Sphagnum moss is the most important plant in the development of peat bogs. Each year the tips of the sphagnum shoots grow upward an inch or two and the lower portion of the stem dies. In this manner beds of peat moss gradually build up and raise the surface level of the bog, in time permitting invasion by cranberries, blueberries, and other characteristic bog shrubs and trees. Meanwhile, because of the very slow rate of decay of organic remains in bogs, a record of bog development is left behind, buried and preserved for hundreds or thousands of years. By analyzing this fossilized record, scientists can trace the vegetational history of a region. In several peat bogs of Europe, animals and persons have been discovered in a remarkable state of preservation. One such bog recently yielded a knight in full armor! Studies of peat bogs in New York have shown the sequence of revegetation of the State in post-glacial time.

Sphagnum is our only moss of commercial importance. In several European countries, where coal and firewood command premium prices, peat is mined as a fuel. In this country, as all gardeners know, peat moss is used in the nursery trade, primarily as a garden mulch or in topdressing for lawns. Peat and sphagnum will absorb over twenty times their own weight in water and dry out very slowly. Mixed with soil or spread over the ground, peat moss lightens the earth, discourages weed growth, and prevents excessive drying of the upper soil layers. Nurserymen use the water-retaining capacity of sphagnum for shipping live plants and, for the same reason, use peat moss as a medium for plant propagation. Most of the peat moss sold in this country is shipped from Canada, where harvesting it from bogs is a major enterprise.

Although peat mosses are difficult to distinguish without microscopic examination, seven species warrant mention. *Sphagnum recurvum* forms floating mats in pools and may be recognized by the relatively few clusters of dwarf branches along the main stem. *S. squarrosum,* on the other hand, inhabits the drier hummocks of bogs and is densely

clothed with side branches. Two species, *S. magellanicum* and *S. capillaceum,* have a purplish or reddish tinge, especially when growing in strongly acid bogs. One species, *S. palustre,* is very pale green and upon drying turns nearly white. Although most species of *Sphagnum* typically occur in bogs, a few species grow in seepage areas in the woods. Those hardy souls who climb the high peaks in the Adirondacks may make the acquaintance of two noteworthy species: *S. girgensohnii,* our most common woodland species, very abundant in the Mount Marcy area where water drains across the bedrock along the trails in the spruce-fir belt; and *S. pylaesii,* which stands out as a deep rust-colored fringe on the bedrock around the edges of hummocks on the rock cone above timberline.

True Mosses

Although the sphagnum mosses are abundant and important, the bulk of the moss flora of New York State consists of true mosses. These are found in a great variety of circumstances, such as stumps and logs, bare soil and flowing water, shaded crevices and rock walls. Moreover, true mosses exhibit a tremendous array of sizes, shapes, and colors. Granted that many mosses look alike because of their small size, each species presents a new and unique assortment of characteristics when examined closely. To learn these combinations one needs only a hand-lens, a little time, a little patience.

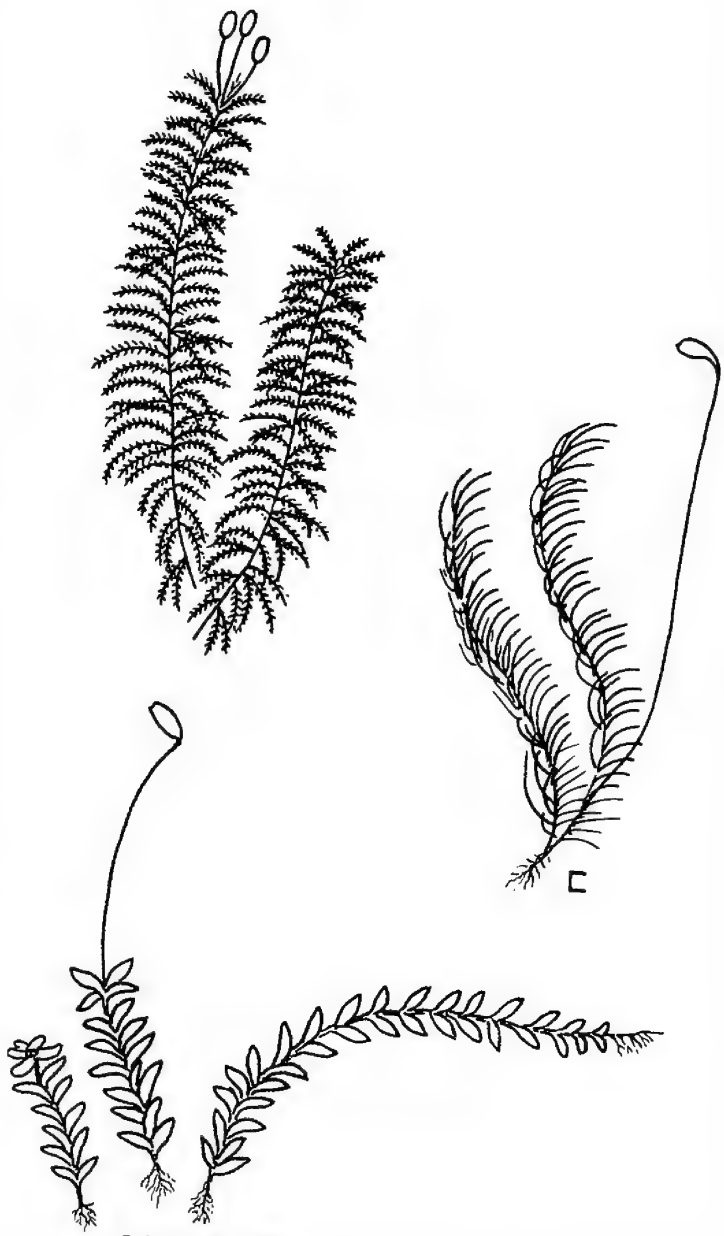
Just what does distinguish a true moss? How may we recognize one in the field? Quite simply. True mosses lack the whorls of short branches along the erect main stem; their side branches arise singly or at most in pairs. Secondly, they generally have a ring of teeth, called the peristome, encircling the pore on the capsule. Finally, true mosses occur in dry habitats as well as wet.

Biologists generally classify true mosses into two main groups: cushion mosses and carpet mosses. Cushion mosses are all those forms with erect primary stems that bear their spore capsules at or near the tip of the shoot. Carpet mosses, on the other hand, spread over the ground, producing leafy shoots and spore capsules at regular intervals from the prostrate main stem. Slightly over half of our species in New York are cushion mosses. In general terms, cushion mosses are pioneer species, adapted to sunny sites, while the carpet mosses prefer the cool, moist conditions of shaded woods.

Many perplexing forms occur in New York State and even the expert has trouble identfying some of them! Here are a few of the more conspicuous ones.

Cushion Mosses

The first word of the name *Dicranum scoparium,* when translated, means that the teeth of the peristome are split into two parts; the second word means that the leaves are all swept to one side. (The first word is the name of the genus; the two together, the name of the species.) The common name, broom moss, also refers to the sweep of the leaves toward one side of the stem, the most conspicuous feature of the plant. Incidentally, because many mosses differ from each other only in minute details and are difficult to distinguish from each other, only the more unusual ones have acquired common names over the years.



Broom moss is one of the first species to be noticed by amateur naturalists because it is a large, robust plant and relatively common. In addition to the curved leaves, the shoots are soft and glossy, and a dark, rich green in color. The capsules, when present, are quite distinctive; they, too, bend to one side, although not necessarily in the same direction as the leaves.

Broom moss forms large, rather loose tufts or cushions, three to four inches high, on soil, rocks, or decaying wood in moist, shaded places. Actually, broom moss is found in a great variety of ecological conditions, but it seems to thrive best at the base of trees or on the humus and undecayed debris of the forest floor.

The pincushion moss, *Leucobryum glaucum,* is indeed one of our most distinctive species, both in form and color. The plants occur in dense, compact clumps, nearly as tall as broad, perfectly symmetrical in outline, and up to five or six inches across. Occasionally adjacent clumps meet

at their edges, forming uneven patches which cover several square feet of ground. Each clump looks like a light green pincushion. When wet, the clumps resemble broom moss in shape and color, if viewed from a distance of several feet; when dry, however, they undergo a remarkable change in color to the pale green characteristic of sphagnum moss. Because the base of each stem dies as the colony grows larger, the clumps gradually lose their firm attachment to the ground; if growing on a slope, the slightest disturbance may set them tumbling downhill.

Pincushion moss prefers relatively dry, wooded slopes where the ground vegetation is sparse, such as under beech and hemlock stands. This species is a "must" for all moss collectors.

Few species of moss are as peculiar as the grain-of-wheat moss, *Diphyscium foliosum.* The leafy shoot is poorly developed, and the leaves themselves so small that the plants would be overlooked, were it not for the remarkable spore capsules. The capsules, lacking stalks to elevate them above the ground, resemble small grains of wheat lying directly upon a dark green, velvety mat. Each capsule, lopsided in shape, is golden-brown except for a tuft of whitish hairs, really the peristome, standing out at the top. One bryologist has likened them to little soldiers standing at shoulder arms! If a mature capsule is tapped lightly, a puff of spores is ejected from the top, much as in a puffball.

Grain-of-wheat moss is found on moist, shaded banks and clayey hillsides. When barren, the plants are easily overlooked even by experts on hands and knees. In fruit, however, the species is unmistakable.

Our first three true mosses occur on acid soils or decaying organic material. Twisted moss, *Tortula ruralis,* is just the opposite in habitat requirements. It grows only on alkaline rocks. On massive limestone outcrops in central New York, twisted moss forms pure beds or stands many yards square; it acts as a pioneer, establishing a vegetation cover in which higher plants become established.

Two features, visible with a hand-lens, distinguish twisted moss. First, the bright yellow-green leaves, which are slightly folded along the midrib, have a prominent toothed hair or awn sticking out beyond the tip, giving the stems a bristly appearance. And second, the peristome teeth are very long, very narrow, and spirally twisted two turns.

The peculiar common name, flat fork moss, of the next species, *Fissidens adiantoides,* requires explanation. "Fork" refers to the peristome teeth which resemble those of *Dicranum,* each being cleft into two or three prongs or divisions. And the "flat" describes the leaves which differ from the leaves of all other mosses, being arranged in one plane rather than spirally distributed around the stem. An additional feature is the manner in which each leaf clasps the next one immediately above, as is seen in the iris. The several species of *Fissidens* share these characteristics and are separated from each other by variation in such secondary characteristics as teeth along the leaf margin or shape of leaf tips.

Flat fork moss may be found in a great variety of habitats. It grows most abundantly on heavy soils but also may occur, less frequently, on stones, rocky ledges, and the bases of trees. When growing in narrow crevices and similarly protected spots, the stems are parallel with each other, the flat sides facing the source of light.

The rock orchard-moss, *Orthotrichum anomalum,* has one feature which distinguishes it from all other species of orchard-moss. In contrast with other members of the genus, which are able to grow only on the bark of trees in orchards or similar open areas, this species grows exclusively on rocks. Praise be to the nonconformist!

Rock orchard-moss inhabits limestone rocks, but forms small clumps or cushions only a few inches in extent, never the broad mats of twisted moss. It fruits quite abundantly, and the distinctive capsules may be used in identification; they are erect, only slightly extended beyond the leaves, and have eight prominent ribs along the sides. When freshly mature the capsules are topped by a hairy, bell-shaped cover, called the calyptra.

Cord moss is a weed, because it is found everywhere in locations at all suitable to vegetation. Cinder heaps and burnt fields are preferred locations; in such places cord moss, *Funaria hygrometrica,* may form a continuous mat several yards square. The only place it seems to avoid is strongly acid soil.

Cord moss is easily recognized. The leafy portion of the stem resembles a small green bud; from many of these little shoots capsules are borne aloft on reddish brown stalks, which twist and bend in response to changes in atmospheric moisture. The capsules are dark brown, pear-shaped, and densely clustered since the plants fruit abundantly.

The silvery thread moss, *Bryum argenteum,* is the green line in the cracks of sidewalks over which most of us step, unaware, each day. Whether in crevices of pavement, on stone and cement walks, or on dry compact soil, silvery thread moss is all around us. Moreover, by treading on it, we help it to spread, since tiny fragments of leaves, carried from one place to another on the soles of shoes, may regenerate new plants upon falling again to the ground. Each of us, in the course of our daily lives, has undoubtedly helped in the spread and establishment of hundreds of plants of this hardy voyageur of the cement canal!

Silvery thread moss may be recognized by the silvery color of the shoots, as one would suspect from translating the specific name. The leaves actually are dark blue-green, but the tips lack chlorophyll and thus appear shiny.

The toothed mnium, pronounced nyé-um, is a frequent denizen of forest and woods. In moist, shaded places it will grow into deep, intertwining mats on rocks, soil, logs, and tree trunks. *Mnium affine* is widely distributed throughout the State in hardwood forests.

Two types of shoots are seen in this species. Some, the fertile shoots, are erect with large, round, toothed leaves clustered in a rosette at the tips of the stems. Others arch over to the side and, like the runners of a strawberry plant, root at the tips, thereby propagating the plant vegetatively. When fruiting, capsules occur in sets of two or three at the top of the upright shoots; such clustered capsules are a rarity among mosses, most species having only one capsule to a fertile leafy shoot.

The common hair-cap, *Polytrichum commune,* is our tallest moss. The average height of its leafy shoots is three to four inches; add another two inches of capsule and stalk, and we have a giant, as far as mosses are concerned.

When shaded, the stems may become exceptionally long; one clump in Indian Pass near Mount Marcy is eighteen inches tall, by far the tallest stand of moss known in New York State. Because the male plants produce rosettes of leaves at the shoot apex each year, it is possible to trace the yearly growth and count the age of the stem. The Indian Pass population is at least seven years old; how much older is uncertain because the leaves on the lower stems were too decayed for accurate counting.

When mature the capsules of *Polytrichum* are completely enclosed by a very hairy calyptra, whence the common name hair-cap. The stems, usually unbranched, are covered with compact spirals of narrow, pointed leaves.

Common hair-cap prefers damp, acid soils. It is an important pioneer on both sandy barrens and marshy fields, where it forms dense, olive-green sods. In some sections of the Adirondacks where sandy soils predominate, stands of hair-cap moss serve as seedbeds for the natural establishment of such conifers as white pine.

Beard moss, *Pogonatum pensilvanicum,* is closely related to hair-cap moss, and indeed might be mistaken for a hair-cap if only the capsule and calyptra were examined. However, beard moss does not produce leafy shoots. The protonema arising from the germinated spores remain functional and persistent throughout the growing season, making nearly all the food for the plant. The few leaves are found only at the base of the capsule stalk.

Carpet Mosses

The carpet mosses, although easily recognized as a group, are difficult to separate into genera and species with only a hand-lens; we have selected six distinctive species easily recognized by gross form.

Perhaps no other carpet moss is as attractive as tree moss, *Climacium americanum.* Just imagine a stately white pine tree miniaturized to four inches tall. Behold, the tree moss! The main stem is hidden in the ground, but from it arise robust and erect secondary stems bearing numerous side branches, those at the base of the stem the longest and those at the summit the shortest, all distributed evenly along the upright stalk. The whole effect is one of a symmetrical conifer in graceful attire. The close-packed stands remind one of a coniferous forest viewed from a mountain summit. Once seen, the image of them is never dimmed.

We move to a drastically different habitat for the common water moss, *Fontinalis dalecarlica.* This species, one member of a family of aquatic mosses, grows submerged in swiftly flowing streams and brooks. Many long, slender stems, often over two feet in length, will be found attached to some underwater object, such as a log. Flowing back and forth with the currents, the colonies resemble seaweed more than a moss; a quick check, however, will show the typical thin, pointed leaves, at least on the younger portions of the stem. Curiously, the spore capsules develop on the denuded older sections of the stems and, lacking stalks, look like little vegetative buds. The peristome resembles a small conical trellis or delicate sieve, beautifully intricate in design.

The wire rock moss, *Hedwigia ciliata,* is named in honor of Johannes Hedwig, a European botanist who specialized in the study of mosses. The botanical names of many mosses originated with Hedwig more than one hundred and fifty years ago.

The wire rock moss is a wiry-stemmed moss of dry, acid rocks. On boulders, ledges, even on stone walls, rather loose patches develop, occasionally over a yard across. When wet they appear yellow-green, not much different from other mosses; upon drying, however, they turn a striking pale gray-green. The whitish tips bend back away from the stem, giving the whole plant a hoary appearance. Incidentally, the capsules may be hard to find at first, because they are enveloped by nearby leaves. Only the lid may be exposed. On removing the lid, one will see that this species lacks teeth around the pore, a relatively rare condition among true mosses.

The plume moss, *Ptilium crista-castrensis,* is especially well named. Each golden-green frond resembles a small ostrich plume three to five inches long. The individual leaves are very small, narrow, closely crowded together, almost invisible to the naked eye, but the feather-like branches lend a delicate grace to the shoots which is unknown in other species.

Plume moss requires the cool, moist habitats of deep forests and wooded bogs, where moss growth is particularly luxuriant. Stands are seen in damp spots on the forest floor, although a few stems may trail solitarily over decaying logs. The bright golden-green shoots contrast sharply with the ordinary yellow-green of associated species. Large stands, a foot or more across, present the most striking and beautiful scene in all mossdom.

Common feather moss, *Thuidium delicatulum,* is one of our more frequent woodland mosses. Whoever tramps the trails in New York woodlands sees it on decaying log and stump, stones and rocks, stream bank and trail side. The stems branch two or three times in delicate green finery. The little fronds thus formed are three or four inches long and, as they spread outward, cover the ground with several levels of interlacing greenery.

In contrast with the common feather moss, which grows in hardwood forests, the mountain feather moss, *Hylocomium splendens,* prefers the mixed woods and pure coniferous forests of higher elevations. There it replaces the former species as the dominant moss of the forest floor.

Superficially, mountain feather moss resembles its lacy lowland relative, but it differs in one notable feature—each year a new frond arises from the middle portion of the frond of yesteryear. The new frond grows erect at first, but then arches gracefully to the side. In this manner, a new layer of fronds is superimposed upon the stand. By counting the number of such annual innovations, we can determine the age of the colony.

PHYTO-ILLUMINATION

By STUART DUNN AND CARL J. BERNIER

Dr. Dunn is Plant Physiologist in the Department of Botany, University of New Hampshire, Durham. Mr. Bernier is a member of the Commercial Engineering Department, Sylvania Lighting Products, Danvers, Massachusetts. The following is adapted from a paper they prepared for *Fluorescent Lamps*, Bulletin 0-230.

PHYTO-ILLUMINATION means the use of light other than sunlight in aiding plant growth. This may be as a supplement to natural daylight or sunlight or the sole source of light. The question may now be asked: why is light needed by plants?

Light is necessary for the fundamental process of photosynthesis. This is the putting together by means of light two simple substances, carbon dioxide and water, to form complex compounds such as sugars and starch. The green pigment chlorophyll plays a vital role in photosynthesis. The latest theories on the mechanism of this series of reactions, backed by recent experimental evidence, indicate that light energy causes chlorophyll to become "excited," or active. In this state it is able to pass electrons on to other compounds. Here the chlorophyll probably acts not as a single molecule, but in a whole group, somewhat as a photobattery. By a series of complex enzyme systems (catalysts), enough electrons are passed on and gathered together to aid in uniting phosphate groups with complex intermediate organic compounds. These are united or held together by "high-energy phosphate bonds," high in potential energy, and they then aid (by other enzyme systems) in reducing carbon dioxide to form carbohydrate. This explanation is over-simplified, but it illustrates the importance of light in photosynthesis.

Light also plays a part in the formative processes of the plant, whether it produces flowers and seed (reproduction), or remains vegetative (leaves, stems, and roots). This general type of response is called photoperiodism and is governed by the relative lengths of day and night. It is primarily the length of the dark period, rather than the length of the light period, that is significant in causing plants to bloom or not to bloom. The older terminology still holds, however, in speaking of plants as either short-day, long-day, or neutral, in respect to flowering response. This is to give darkness its due, but light has no minor role in growth changes. During the light periods both intensity and quality (wave length) of light are important in controlling photoperiodic response.

Very recently, scientists of the United States Department of Agriculture working at Beltsville, Maryland, isolated a growth-triggering chemical in plants which governs growth changes. It is a blue pigment called Phytochrome, which is affected reversibly by red and far red (dark purplish to the eye) light. Red light will reverse the effect of far red, and vice versa, if the plant has been previously conditioned by the proper lengths of dark periods.

All this may be summarized by saying that light plays a twofold role in plant growth: first, it furnishes energy for making carbohydrate (also releasing oxygen as a very important by-product); and second, it governs photoinduction of various responses, such as photoperiodism, germination of some seeds, red color in fruits.

Studies in the plant physiology laboratory at the University of New Hampshire are under the direction of Dr. Stuart Dunn.

REASONS FOR PHYTO-ILLUMINATION

There are several reasons for using electric light as an aid to plant growth. One of the earliest practical applications was the use of electric light to supplement or extend the length of natural days. This is often done in greenhouses, especially with florists' crops. It is used to lengthen the short days of winter and thereby cause out-of-season blooming of certain flowers; and to hold back for the market certain other kinds affected by opposite conditions. Recent findings have caused changes in practice, namely breaking the dark period at midnight with light.

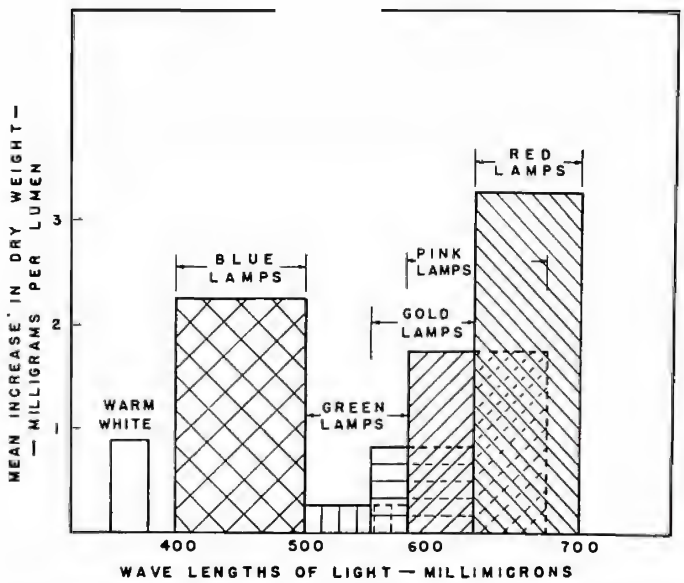
Another very important aspect of the use of artificial light for plant growth is in scientific experimentation. Artificial light may be much more precisely controlled than daylight in intensity, quality, and length of exposure. The intensity of daylight may vary enormously from dawn to dusk. Even on a bright sunny day a passing cloud may sharply decrease the intensity of light. On a dull, cloudy day in winter the intensity reading in a greenhouse may be as low as about 250 foot-candles; on a sunny summer day it may read as high as 10,000 fc. Variations in quality of daylight (spectral make-up) are not so exactly measured or known, but the spectral value may vary considerably with the angle of incidence of the sun's rays and the resulting variations in distances of the earth's atmosphere through which they must travel. All this is also considerably modified by other atmospheric conditions. Photoperiodic effects already have been mentioned. The fact that in the northern

hemisphere days gradually lengthen from late December to late June, and gradually shorten during the rest of the year, makes it very difficult to secure precise data on plant response for a given set of conditions.

These and other considerations led scientists and investigators to use electric light in many ways. Equipment and apparatus varied from the very simple and inexpensive to the very complicated and costly installations. One of the simplest and earliest methods was to hang a few incandescent lamps above plants in a greenhouse bench and then to enclose this area with cloth curtains to keep out daylight. This worked fairly well in cloudy and cool weather, or under winter conditions, but ventilation and temperature control were always problems. In recent years there has been extensive use of basement rooms or of specially built environmental control chambers as a part of laboratory facilities, where the sole source of light is from electric lamps. Such chambers may be only air-circulated by fan, or they may be completely air-conditioned.

By far the most complete and elaborate facilities to study not only the effects of light on plant growth, but of other environmental factors as well, are in laboratories designed and built expressly for this purpose alone. A notable example is the Earhart Laboratory at the California Institute of Technology, for which Dr. F. W. Went, its designer and former director, coined the name "phytotron." Other phytotrons have been built in Europe and are described in *Control of the Plant Environment* by J. P. Hudson.

In most of these growth chambers and other environmental control installations, fluorescent light has been used to a large extent, chiefly because: (a) It is relatively cool light, particularly if the ballasts are placed at some distance from the plants, or even entirely outside the growth chamber. (b) The lamps are available in different colors, furnishing a fairly wide and separate representation of different parts of the spectrum. Spectral emission curves for these lamps are available and afford an exact basis for finding what parts of the spectrum affect plant growth. The relative consumption of electric current is low for these lamps, even though the initial installation cost may be high.



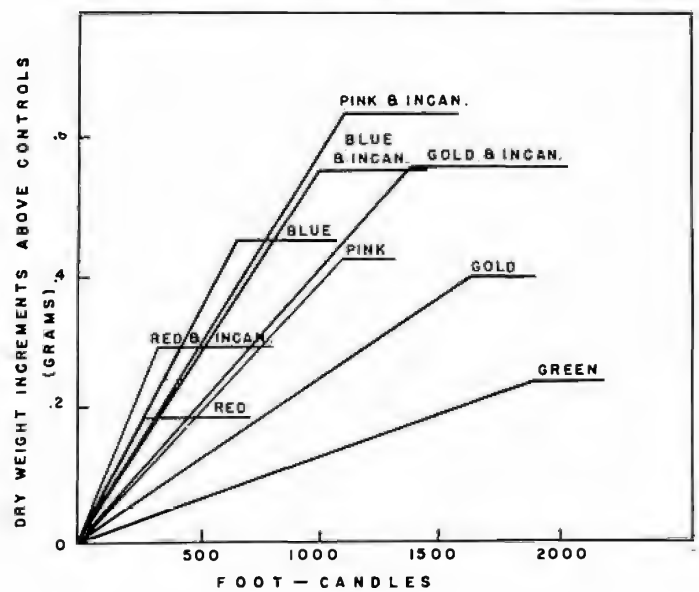
Increase in dry weight of lettuce plants with warm white light as the control quality. Twenty-eight-day test period.

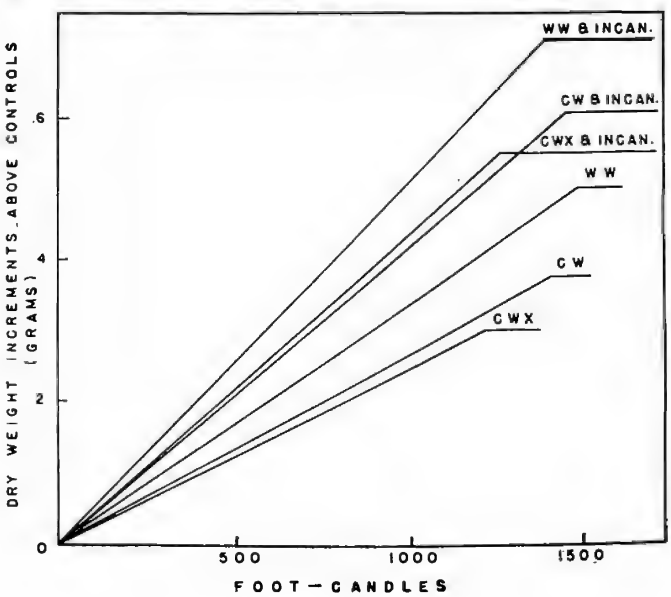
Plant Research With Electric Lamps

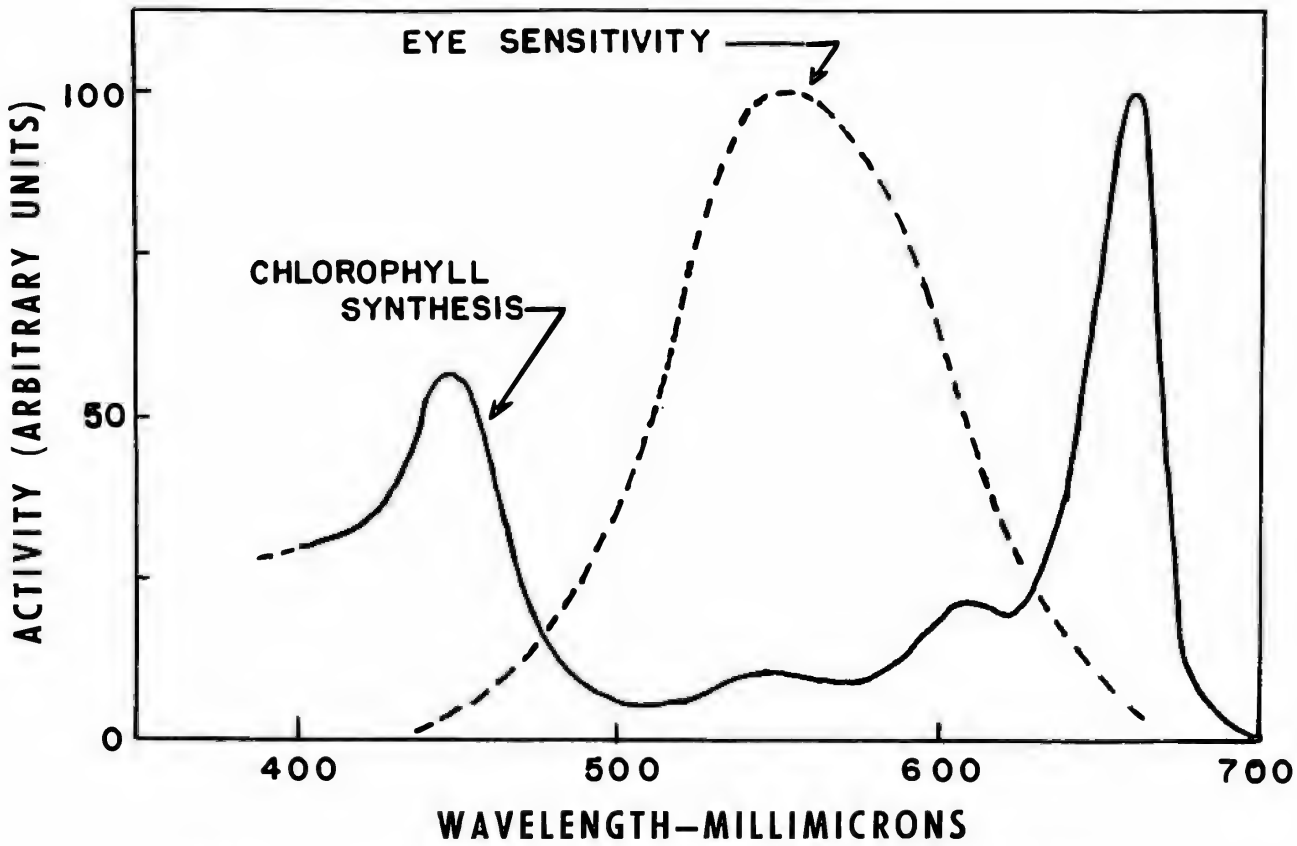
At the plant physiology laboratory of the University of New Hampshire, an air-conditioned basement room (with an adjoining greenhouse) is devoted to research on light and plant growth. This room is equipped with several sets of luminaires for fluorescent lamps, some forty-eight inches and others ninety-six inches long. They are hung by rope and pulleys above the plants so that they may be adjusted to any height for various intensities at plant level. The plants are grown on rotating tables to provide equal intensity at any one of the six tables in a row under each luminaire. This is particularly necessary when the luminaires are slanted to achieve a series of varying intensities from one end to the other. Plant containers are of polyethylene, filled with vermiculite and supplied with a standard nutrient solution at intervals.

Five different colors in fluorescent lamps, as well as several kinds of white lamps, have been used in this work. Comparisons have been made on the effects of incandescent

"Slope" of dry-weight–yield curves for colored and white fluorescent lamps alone and with incandescent.







Spectral activity of the chlorophyll synthesis process. Visual sensitivity curve is shown.

Light energy measurements are being made by using the thermophile with water filter in the laboratory at the University of New Hampshire.

Interior of the chamber used for growth studies. Automatic control is provided for temperature, humidity, light intensity, and light period.

light alone and in mixtures with fluorescent light. Standard photoperiods have been maintained by automatic switches.

One way of measuring the growth responses — in other words, the plant tissue production — of several different kinds of plants under these lamps has been to take fresh- and dry-weight yields. Typical of the yield data for many plants in the vegetative stage is that shown for lettuce, calculated on the basis of units of weight per lumen of light. The yields for the plant under each kind of lamp are arranged in the order of the emission of light by the lamps in the different portions of the spectrum. The width of the columns is without any significance except to show the extent of the chief portion of the spectrum emitted by each lamp. The red light (not commercial red fluorescent, but a special high-intensity red) produced the greatest plant response, and blue light was the next highest. Blue light showed much greater relative effect on dry-weight than on fresh-weight yield. The response to pink light was next in size, probably because of the large amount of red light in its make-up. The effect of these three was considerably greater than that of warm white. The yields for both green and yellow light were very low. Very similar results have been obtained with tomato seedlings and mustard.

Another way of measuring and demonstrating relative efficiencies of lamps and their light in promoting plant growth is by so-called saturation curves. These are provided by securing yields at a series of increasing intensities. The point at which the curve flattens out into a plateau—that is, the intensity beyond which no increase in yield is obtained—is regarded as the saturation point of the plants for light under these particular conditions. Very extensive experiments on tomato seedlings were carried on at the Earhart Laboratory, under very exactly controlled conditions, to provide these kinds of curves for many different kinds of lamps and combinations of lamps. Examples of saturation curves for the plants under various light qualities and mixtures of light are given in accompanying charts from

Exterior of the growth chamber designed for controlled experiments.

the paper by Dunn and Went published in *Lloydia.* One of the features of the data worth noting is that in spite of the very low intensity of the red light (these were commercial lamps) it is more efficient than light from any other fluorescent lamp, as indicated by the steepness of the "slope" of the line. For some of the lamps (pink, gold, and red) the addition of incandescent light increased both the total yield and the slope. Addition to blue only increased its total yield. Blue as well as red had a steep slope. Green and yellow (gold) were again poor in response—this time in terms of slope as well as total yields.

The results raised some interesting questions: what would be the effects of red or blue light of much higher intensity? what would be the effects of light from a lamp combining red and blue of high intensity?

In experiments combining individual red and blue (high intensity) lamps, a substantial gain in yield was obtained over that produced by the best previous combination, warm white plus incandescent. Also, the photosynthetic efficiency was just as high as in red or blue light by itself.

A look at a typical spectral activity curve for the chlorophyll synthesis process helps explain this peculiar growth-behavior of green plants. For good growth at least two different bands of radiant energy must be provided, red and blue, each affecting growth in a different way. Furthermore, green light is very ineffective in both synthesis and growth; in fact, some experimenters find that the green wave lengths have an inhibiting effect on growth.

Possibilities of a New Light Source

From the foregoing discussion it is apparent that an electric lamp which would emit light high in the red and in the blue parts of the spectrum might be good for certain phases of plant growth, or for certain plant responses. It is probable that a redistribution of most of the energy of such a lamp into these two spectral regions might be an advantage.

Light Measurements

Levels of illumination expressed in foot-candles are quite meaningless in this work. The word "light" must be characterized by total irradiation intensity and by spectral composition of the radiation.

An instrument used in laboratory tests to measure total radiant energy consists of a thermopile and a sensitive microvoltmeter. With a filter consisting of 2.5 cm of water between two glass plates, the thermopile has a response which is quite uniform over the range of 3,500 to 10,000 Ångstroms* (that is from the near ultra violet to the infra red). The spectral energy distribution of the lamps is measured with a spectro-radiometer.

With these data, values of useful light radiation at all wave lengths are derived by taking the product of energy output in watts and the percentage use by the absorption medium.

In phyto-illumination, the term "light" must be interpreted in a wider sense than that usually attributed to visible light. Basically, electric light sources or lighting installations provide one of the indispensable environmental conditions for almost all living things.

Botanists, plant physiologists, greenhouse operators, professional and amateur horticulturists will be interested to learn that light sources tailored to their specific requirements may become a reality.

*Angstrom — a minute unit of length equal to one hundred-millionth centimeter, used to express the length of light waves.

THE UNICEF NUTRITION PROGRAM FOR CHILDREN

By Harold J. Humphrey

Mr. Humphrey, who is Consultant in the Food Conservation Division of the United Nations' Children's Fund, has been described as "a sort of UN ambassador to the food industry of the world, to persuade private enterprise to offer its resources in the search for solutions to the food problems overseas."
At the time of his retirement in 1959, he was Research Consultant to the General Foods Corporation. He is a pioneer in the research on and development of frozen foods, serving as President of the National Association of Frozen-Food Packers. He served for seven years as member of the Research Advisory Committee on Frozen Products of the United States Department of Agriculture and for three years as a consultant to the Army Quartermaster Agency investigating the irradiation of food. Before his entry into the food industry, Mr. Humphrey spent nine years in the Bureau of Chemistry, United States Department of Agriculture, in Federal Food and Drug law work. He is a member of the American Chemical Society, the American Association for the Advancement of Science, and the Institute of Food Technologists.

In the fall of 1960 Dr. David J. Rogers, Curator of Economic Botany, made a trip to Jamaica and Brazil on behalf of UNICEF to collect leaves of twenty varieties of *Manihot esculenta* to be tested for their nutritive value, in the hope of finding protein supplements for the diet of undernourished children.
In December, 1961, Dr. Max Milner, Senior Food Technologist of the Food Conservation Division, UNICEF, addressed a staff seminar of The New York Botanical Garden on "The U.N.'s Efforts in the World Protein Shortage."

The word "UNICEF" may cause readers of *The Garden Journal* to think of milk, trick or treat, and greeting cards. UNICEF has an excellent reputation, but too little is known about its purpose, its history, its organization, and what it is doing for children in the fields of health, nutrition, and social welfare.

UNICEF was established by the United Nations in 1946 to take care of the children primarily in war-devastated Europe. With that job well done, it turned its attention to the needs of children in the developing countries. It was given a three-year term in 1950, and in 1953 the General Assembly voted to continue it indefinitely, officially as the United Nations' Children's Fund. We continue, however, to use the well-known symbol UNICEF.

The financial support of UNICEF is by voluntary contributions, mainly by governments now numbering one hundred, but with substantial amounts from trick or treat, the sale of greeting cards, and contributions from individuals and organizations.

UNICEF allocations to projects are now between twenty-five and thirty million dollars annually, with more than half of this amount for disease control and health services. One-third is for child feeding and other nutrition programs, including the recently inaugurated nutrition education.

UNICEF operates only on projects requested by governments, with responsibility for each project remaining with the government. This is the best assurance of success. UNICEF helps in the planning, furnishes equipment and supplies not locally available, provides engineering assistance, and helps in the training of national personnel and in numerous other ways. In 1961, one hundred and seven governments received aid, and of these sixty-eight also made contributions to the general fund of UNICEF. Some of the one hundred governments making contributions do not receive aid — for instance, the United States and Great Britain.

Hunger is one of the principal sicknesses of children in the developing countries and is responsible for a considerable proportion of disability and death. There are 1,600,000,000 inhabitants in countries where the average income per person is less than one hundred dollars a year. Hunger is the lot not only of children, but of large sections of the population. Children, however, have special needs and present also special opportunities, and these must be of concern to UNICEF.

There are two types of nutritional deficiency: first, under-nutrition, or a need for more food, and second, malnutrition, because of a lack of one or more essential nutrients. Under-nutrition is simply partial starvation, or chronic calorie deficiency. In infants, this leads to nutritional marasmus; this is characterized by under-weight, atrophy of muscles, a shrivelled face. In older children, under-nutrition is associated with growth retardation, under-weight, lethargy, and apathy.

Under the heading of malnutrition, the most widespread deficiency is of protein. Protein malnutrition is most serious in countries where starchy cereals, such as maize or rice, and roots, such as manioc or yams, form a staple diet.

We look at a superb package of proteins every time we stand before a mirror. The muscles, skin, hair, nails, and eyes are largely protein. Add to these blood, lymph, heart, lungs, tendons and ligaments, brain and nerves. Genes are a particular type of protein. So are hormones and enzymes.

After water, protein is the most plentiful substance in the body, accounting for almost half the dry weight of the body. A third of the protein is in muscle and a fifth in bone and cartilage.

As in the United States, Great Britain and other developed countries, so also in many of the developing countries mothers are weaning their babies at an earlier age. Usually the baby is then fed the family diet of starchy foods which will not build muscle, bone, or the cells of the body because of the lack of protein.

Kwashiorkor is prevalent in the tropics of Africa, Asia, and South and Central America, where carbohydrate foods form the bulk of the diet, and protein-rich foods are unavailable or too costly. The strange word Kwashiorkor has only recently become established as a meaningful scientific term in clinical and nutrition literature. It is derived from Ghanaian dialect and means "the child who has been displaced." It symbolizes the fate of the infant taken from the mother's breast when its younger sibling pre-empts its position there. Kwashiorkor is attended by arrested growth, arrested bone development, mental apathy, and finally severe general malnutrition. The belly is distended, edema is evident in the legs, and the hair turns reddish or falls out. It is often complicated by diarrhea or infectious disease which may precipitate the clinical appearance. Mothers react to the stomach upsets characteristic of protein deficiency by putting children on a near-starvation diet, in the hope that the disturbances will clear up: instead, they are made worse.

The incidence of bad nutrition in children is not known statistically. Of the 1,600,000,000 inhabitants in the underdeveloped countries there are probably four hundred to five hundred million children who may suffer at one time or another from protein malnutrition.

UNICEF and the receiving governments recognize that the world surplus of dry skim milk will not be available indefinitely. To stimulate local production of milk in volume, UNICEF has aided over two hundred milk plants by engineering services and equipment. For the average milk project, an amount over five times the value of the UNICEF aid has been contributed by the local government.

Recognizing the need for answers to the scarcity of protein foods and the impossibility of getting milk in many areas of the world, the United Nations agencies have directed their energies toward finding additional and new sources of protein-rich foods for child feeding. Products at present under study and development include oilseed presscake flours, soybean products, and fish flour.

Fish is an excellent source of protein, but the consumption of fresh fish in many countries cannot be extended more than fifty miles from the coast because of lack of ice or refrigeration. There is interest in a fish-protein source which can be produced, stored, and transported at low cost. A fish flour would meet this objective.

The nutritive value of a protein is based not only on its digestibility, but on its amino acids. The work of a number of investigators show that the essential amino-acid content of fish protein compares favorably with that of meat. Rat-feeding tests show that fish proteins are equal to and in some instances better than meat. Fish and particularly their viscera are a rich source of vitamins and minerals.

During the past year surveys of world-wide developments on fish flour have been made by UNICEF and the Food & Agriculture Organization. These showed that work had been going on for at least the past fifteen or twenty years with varied results. The actual production of fish flour is now only in its early stages.

Now as to vegetable protein. The presscakes remaining from the industrial extraction of oil from peanuts, cottonseed, soybeans, sesame, or coconut are at present used mainly for animal feed or fertilizer. These by-products are rich in protein and low in cost. Our object is to encourage

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Ernest Jesse Palmer, collecting in 1925.

THE PASSING OF A NATURALIST

By CAROLINE K. ALLEN

Dr. Allen is Research Associate of The New York Botanical Garden.

MANY TWENTIETH-CENTURY WRITERS appear to consider the dictionary definitions of "naturalist" inadequate, for frequently we find a new interpretation used to suit the need of the moment. I like to think of a naturalist as one who not only studies, but has a deep and abiding love for the many phases of natural history. By any definition, the world of natural history lost one of the most outstanding naturalists of the last fifty years, when Ernest Jesse Palmer died at his home in Webb City, Missouri, on February 25, 1962.

The Palmers came from England in 1876 with their three-year-old son, Ernest Jesse, to the Tri-State area of Missouri. Thirteen years later the family was permanently located in the Webb City home that was to become so well known to naturalists sixty years later.

The young boy's intense curiosity concerning the wealth of minerals in this part of the country prompted the early collections that formed the nucleus of the Palmer "Little Museum," which has grown with the years in every dimension. As the problems of geology and archaeology continued to absorb him, background study of plant and animal life inevitably became the next step. With this rather oblique introduction to the science of botany, he had truly found his life work.

His father's illness forced Ernest to leave the old Webb City Baptist College before obtaining a degree. However, the effect of the thorough classical training of the school, particularly in Latin and Greek, is to be seen in many of his writings.

In 1913, when freedom from home responsibilities finally allowed him to pursue his botanical career, he went to the Missouri Botanical then, as now, popularly called "Shaw's Garden." A year later, sponsored by this institution and Harvard's Arnold Arboretum, he traveled extensively in the southwestern states to make herbarium specimens of, and notes on, the plants of the region. Eight years later (1921) he joined the staff of the Arnold Arboretum as collector and assistant, where he remained until his retirement in 1948. He prepared specimens of exceptional quality, accompanied by full and accurate field observations which added materially to knowledge of the area he knew so well. As a result, he became an authority on its flora, co-authoring with Dr. Julian A. Steyermark, *An Annotated Catalogue of the Flowering Plants of Missouri.* He retained, too, his early interest in ferns, publishing scientific treatments in many regional floras and notes in current journals as well. In the meantime, the man continued to collect zealously the various types of natural history specimens that had so intrigued the boy, and to search out the pertinent data with an eagerness sharpened by mature experience.

Professor Charles Sprague Sargent, for fifty years Director of the Arnold Arboretum, had long dreamed of a living collection of hawthorns (*Crataegus*) for future observation and study. Through Palmer, this became a reality. After Sargent's death, Palmer took over the tremendous task of revising the classification of the unwieldy group, over six hundred taxa of which were by that time in the living collections alone. This was the era before genetical and cytological research had advanced the understanding of freely hybridizing and apomictic groups of plants, such as the hawthorns. During the years of study of this group, Mr. Palmer did much to clarify the genus according to the then-known available facts. Again, his published results have appeared in regional floras and in the *Journal of the Arnold Arboretum.*

Through Mr. Palmer's untiring efforts, the Arboretum herbarium has a splendid representation of the cultivated plants that were growing on the grounds during the twenty-seven years of his active work there. A reference collection of importance not only for study, but as a permanent record of many plantings long since gone. As a by-product of this phase of his work, he published the *Spontaneous Flora of the Arboretum,* and also a paper on the geological history of the tract of land comprising its acres. During this period, he it was who made the major part of the routine identifications of plants brought or sent in for determination by the public at large. Several well-known authors of books and articles on popular science owe their basic facts to Mr. Palmer's generous help during these years.

In spite of a heavy schedule, he managed to keep in touch with naturalists throughout the world. His personal exchanges with them number in the hundreds. As a result, a natural history collection, at present over twenty thousand plant specimens and general collections of minerals, fossils, and Indian artifacts, is housed in the "Little Museum," a building occupying a corner of the property on which the family home stands. The Museum is open to the public by request, and many naturalists during the last decade have enjoyed the Palmer's hospitality, thereby brightening his years of retirement.

With the many honors that came to him—several plants and even a prehistoric seashell bear his name, to mention a few such—Mr. Palmer still remained the modest, self-effacing, gently philosophical naturalist his colleagues in botany knew.

A few days before his death came the news that the University of Missouri was to confer on him in June the

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FRUITS AND VEGETABLES OF JAPAN

By ALMA W. BARKSDALE

Dr. Barksdale is Research Associate of The New York Botanical Garden.

Continued from the May-June, 1962, issue

A number of vegetables that are not commonly eaten in this country are eaten in Japan. We were served some of them in bars as an accompaniment to *sake.* The Pontocho section of Kyoto is a maze of narrow alleys; opening off these are hundreds of tiny bars, each with three to ten stools, where *sake* is served by charming women who converse with their guests while they warm the *sake* and set out delicious tidbits of food in dishes of varied and interesting shapes and designs. At one of these bars in the spring of the year we were introduced to *zen mai,* the croziers of the Japanese royal fern *(Osmunda regalis japonica).* These must be boiled before they are eaten to destroy the toxic enzyme, aneurinase, which they contain. At the same bar we had *tsukushi,* the stems of *Equisetum arvense,* the common horse-tail. At another bar we had a delicious salad of *na-no-hana,* the flowers of rape *(Brassica chinensis),* a cruciferous plant from which is extracted the oil in which *tofu* is fried. Sprigs of *metade,* smartweed *(Persicaria hydropiper),* and curls, cut from the stem of *udo,* spikenard *(Aralia cordata),* are frequently used as edible decorations accompanying a serving of *sashimi,* raw fish. *Udo* is grown partly in the dark to bring about extensive elongation of the stem. Another flower which is eaten in the spring is that of *Petasites japonicus,* called *fuki-no-to.*

The best-known of the more unusual spring vegetables is *take-no-ko,* the young shoot of bamboo *(Phyllostachys edulis).* The *take-no-ko* of Kyoto, which is especially fine, is most abundant in May. The tip of the shoot is dug and cut off before it has emerged from the ground. The growth of the new bamboo shoots, those that are not cut, is truly amazing. The shoot may elongate by several feet in twenty-four hours, and it may attain a height of twenty to thirty feet within a few weeks. The young shoots are green and thickly covered with soft hairs that feel like velvet.

Renkon, lotus root *(Nelumbo nucifera)* appears in the market in late summer and fall. The roots are segmented, and they look like links of giant sausages, each sausage one to two inches in diameter and four to eight inches long. Another edible root, harvested in the fall, is *gobo,* the root of burdock *(Arctium lappa)* which is very slender and a foot or two long. It is peeled, boiled, and shredded, and eaten plain or pickled. Another fall vegetable in which we took delight was soybeans boiled in their pods, still attached to the stem. We enjoyed shelling and eating the beans as we drank beer.

There are several foods containing polysaccharide which are eaten in Japan but not in this country. One is *konnyaku,* made from the tuberous root of a plant called devil's tongue *(Amorphophallus konjac). Konnyaku* has the texture of very firm "Jello." It is cut into squares or dice and is added to various soups and stews. *Konnyaku* extruded in thin filaments is called *shirataki.* The gelatinous strands of *shirataki* are usually incorporated in *sukiyaki,* the Japanese dish best known to Americans.

To us the most interesting of the starchy vegetables were the taros *(Colocasia esculenta),* tuberous roots rather like a sweet potato in appearance. When they are cut, a white sticky milk flows from the cut surface. A glutinous soup, called *to-ro-ro,* is made by grating uncooked *yama-no-imo,* a kind of yam *(Dioscorea japonica).* Enough soup stock is added to semi-liquify the grated imo. Eating *to-ro-ro* is an art. With the aid of the *ohashi,* chopsticks, one sucks it from the bowl in as discreet gulps as possible, for it tends to come up in long strings like overcooked Swiss cheese.

A number of seasonings of vegetable origin are characteristic of Japanese cooking. The most widely used is a water extract of a dried seaweed, a kelp *(Laminaria japonica)* called *kombu.* It was from *kombu* that glutamate was first isolated by a Japanese biochemist and found to be the substance responsible for the deliciousness of this seaweed. Sodium glutamate for seasoning is sold in Japan under the tradesname of *"Ajinomoto."* Other seaweeds prized for their flavor are *wakame,* also a brown alga *(Undaria pinnatafida)* and *nori,* a red alga *(Porphyra tenera). Wakame* is eaten fresh and dried in soups and salads. *Nori,* in tissue-thin sheets, is served in beautifully lacquered covered containers on the breakfast table in Japanese inns. After ceremoniously removing the cover, one dips the *nori* in *shoyu* and enjoys the combined flavor of iodine, bromide, and sodium chloride. In a four-hundred-year-old restaurant in Kyoto we were served a dish to which a blue-green alga had been added as seasoning. In another Kyoto restaurant we had broiled fish covered with a green sauce made from a species of *Polygonum,* a knotgrass. *Sansho,* the leaves and buds of a prickly ash *(Zanthoxylum piperitum),* is added to sauces and salads for its distinctive flavor, and sprigs of it are used to decorate *sashimi.* Japanese horseradish *(Eutrema wasabi)* is a tuber similar in appearance to Jerusalem artichoke but green inside. *Wasabi* is grated and added to the *shoyu* with which *sashimi,* raw fish, is eaten. It is extremely hot, even hotter than ginger. Tender pink shoots of the ginger plant may also accompany fish.

Mushrooms are used to flavor a number of different Japanese dishes. The most flavorful and delightful of the mushrooms so used is *matsutake,* a species of *Armillaria* that is found only in Japan. It grows in association with the roots of the red pine. Some of the best *matsutake* woods occur on the mountainside near Kyoto, and there we were taken by friends to see the *matsutake* growing in their grottoes of pine needles. During the *matsutake* season in October and November, these mushrooms are flown by Japan Air Lines to the markets of Seattle, San Francisco, and Los Angeles where they are sold for as much as two dollars for one mushroom. *Shitake (Cortnellus shitake)* is cultivated on fallen logs in Japan and is used in both the fresh and dried state. Another cultivated mushroom is *shimeji,* a tiny mushroom, no more than an inch and a half high and a quarter of an inch in diameter at the widest

In May the tea bushes yield their leaves to tea-pickers who still follow traditional patterns.

Right. The hedge-like growth of the tea plants crowd about the hillsides like giant caterpillars.

part of its cap. It is extremely slippery and picking up *shimeji* with *ohashi* from soup is no mean feat.

Several vegetables are added to soups and to the Japanese-style custard, *chowan mushi,* for the contrast in texture that they offer. *Junsai,* the leaf or young seedling of the water-shield plant *(Brasenia schreberi)* is eaten in soups. The leaf and stem have a gelatinous coating so slippery that it is almost impossible to grasp them with *ohashi. Junsai* is grown in a pond not far from Kyoto. *Ginan,* ginkgo nuts, *kuwai,* the tuberous root of arrowhead *(Sagittaria trifolia)* and *yurine,* the bulb of the tiger lily *(Lilium tigrinum)* have a pleasant mealy texture when eaten in soup or *chawan mushi.*

Tempura is food that has been dipped in a batter and quickly cooked in deep fat. A number of vegetables may be prepared in this way, including carrots, parsley, string beans, snow peas, asparagus, small green peppers, tiny eggplants, and sweet potato. Less familiar to us is *shungiku,* an edible chrysanthemum of which both the leaves and flowers are eaten, and *missuba,* a trefoil *(Cryptotacinia japonica),* the leaves of which may be knotted into a bow before being dipped in the batter. Flowers of squash and cucumber are also delicious as *tempura.*

The vegetarian food of the priests of Zen Buddhism is called *shojin ryori;* the same kind of food served to the public is called *fucha ryori.* The *shojin ryori* consists of some thirty kinds of vegetable foods cooked with salt and *kombu* as the only seasoning. At the time of tea-picking, we were invited by friends to have lunch at a restaurant adjoining the ancient Temple of Mampukuji that belongs to the Wobaku School of Zen. This restaurant, famous for its *fucha ryori,* lies in a part of Japan noted for its tea. As a fitting conclusion to this account, I should like to describe the meal served to us that day.

It was a not uncommon aim in old Japan that man's architectural efforts should blend with the natural world in such a way as not to be too obvious. The builders of "our" restaurant at O-Baku had succeeded in creating a refuge almost lost from sight. The restaurant was hidden from the

old street of the town by a high wall which once may have appeared to be of wood and adobe but now, after a few centuries of colonizing by lichens, liverworts, mosses, ferns, and algae, stood as a living barrier to the garden within. A well-beaten path led us to the gate. Half way down the stone-paved way that ran from the gate through the garden, we were met by waitresses who led us to the house that had been reserved for our use. A misty rain was falling so that the stones of the path, the boulders of the garden, and the leaves and flowers took on an enjoyable freshness. Under an eave of the house we removed our shoes and then stepped inside. The house had been set on the side of a small hill in such a way that one half of it, which overhung the pond of the restaurant garden, appeared to float in the branches of maple trees growing at the pond's edge. We had scarcely seated ourselves around our table on the *tatami,* when the rain became heavier. From his place at the table, each of us could look out into a different expanse of fresh green.

To my right there was a small window at floor-level through which I could see the rain splashing from a small stone basin in the ground. Behind me was the open door of the tea house. The broad leaves of a banana tree, framed by the doorway, moved slowly in response to the rain. To the left I could look down through a window near the floor into the pond some twelve feet below. The wall opposite me had a geometric pattern of dark and light rectangles, composed of windows placed at different levels.

The old Chinese names of the courses as given on the menu were read for us by our host. The first, called *sumeh,* consisted of a small beautiful orchid in a clear broth. The second, *mafu,* was a tofu with which ground sesame seed had been mixed. There followed *umpen,* a mixture of *shitake,* carrot, lotus root, poppy seed, peas, bamboo shoot, burdock root, and bean sprouts in a sauce thickened by arrowroot starch. The fourth course, *aemono,* was a mixture of boiled lotus root, burdock root, and bamboo shoot wrapped in *kombu,* which was seasoned with ground sesame. The next course, *shunkan,* consisted of nine vegetables that were in season, each vegetable being represented by one or two small slices. The sixth course, called *yuji,* was a vegetable *tempura* of sweet potato, green beans, and small green peppers. This was followed by *soju,* a soup made with *miso.* The last course consisted of *ensai,* pickles, and *hinton,* rice. We had been drinking hot *sake* throughout the meal, but before the rice was served we finished the *sake* in our cups, for the eating of rice marked the end of *sake*-drinking. After the rice, we drank green tea. We had spent almost three hours at our meal. The food was beautifully served in a variety of elegant pieces of porcelain, mostly in shades of green, said to have been chosen because the restaurant was located near *Uji,* the town not far from Kyoto from which comes the finest green tea of Japan.

Each year, at the time of tea picking, the paintings of the Mampukuji Temple are put out for the public to see. There we went—somewhat reluctant to part from our tea house. That afternoon we had experienced something akin to *hanya-to,* such was the combined effect of the pleasant surroundings, the company of our friends, the delightful food, and the *sake.*

ACKNOWLEDGEMENTS

My husband and I are indebted to many friends for information concerning Japanese food and for guidance given most graciously at restaurants where we were privileged to enjoy some of the best in the culinary art of Japan. Of these, I wish especially to thank Dr. Joji Ashida, Dr. and Mrs. Hiroshi Tamiya, Drs. Shizoku and Atsunobu Yoda, Dr. Kengo Horibata, Dr. and Mrs. Nobotoma Itada, Dr. and Mrs. Masahiko Yoneda, Taki Honjo, and Dr. Mitsue Suzuki. Mrs. Miyako Li of The New York Botanical Garden assisted me in the preparation of the manuscript by checking the Japanese names. Any errors yet remaining are mine, not hers. Dr. Takafumi Moriyama of the Department of Microbiology, New York University School of Medicine, and Sadaoki Kato of The Sanwa Bank, Ltd., were most helpful in obtaining photographs from Japan to illustrate the article.

THE CAMELLIA (Continued from page 123)

The Royal Horticultural Society, there is a delightful account by Cynthia G. Bashael of her trip to see *C. granthamiana.* Apparently only one plant of this species has been found. It grows on the slopes of Tai Mo Shaan near Hong Kong. She gave a glowing description of the beautiful white flower, and it is now the desire of many camellia enthusiasts to add this species to their collections. The late Ralph Peer, an outstanding camelliophile, is said to have been the first person to secure a cion of *C. granthamiana* to be grown in this country. It is now available in some nurseries, and growers are hoping that other characteristics of this newcomer will prove as desirable as its beauty.

Although new and unusual species are becoming better known, *Camellia japonica* in all its lovely forms and colors continues to be the favorite. Experience is proving some varieties of *C. japonica* to be quite cold-resistant, and so the area in which they can be grown advances farther northward each year. Early-blooming varieties, which assure gardeners some blooms before winter, extend the flowering season. In this group are *alba plena,* one of the first to come from China to Europe, 'Aregishi', 'Debutante', 'High Hat', and a lovely family of 'Daikaguras'.

The blooming season of *C. japonica* reaches it peak in January and February. Most of the shows that are held annually throughout the camellia belt are scheduled during these months. The majority of the flowers exhibited are grown out-of-doors, but the greenhouse section at the shows grows larger each year. Certainly the number of varieties increases with each season.

New ones appear very rapidly, but it does not mean that these surpass some of the well-established varieties. *C. japonica* var. *donckelari,* for instance, was introduced from China more than a century and a quarter ago, yet it is always an outstanding flower in any show. Its sport, 'Ville de Nantes', according to records kept by the American Camellia Society, is a consistent winner as "best flower in the show." *C. japonica mathotiana* has a long record of good performances. It has produced some lovely progeny, 'Flowerwood', 'Rosea Superba', and 'Mathotiana Supreme'.

Each year brings some new variety which is a sensation. 'Betty Sheffield' has produced a very beautiful family, 'Betty Sheffield Pink', 'Betty Sheffield Silver', and 'Betty Sheffield

Supreme'. 'Tomorrow', which was introduced a few years ago, is breath-taking because of its color and size. Now 'Tomorrow Supreme' and 'Tomorrow's Dawn' have caught the spotlight. 'Mrs. D. W. Davis', a large semidouble blush-pink flower, won the Illges Medal. Some enthusiasts consider this variety unequaled. There is a report in a very recent publication that a yellow camellia is now an assured fact. This has been a long-hoped-for accomplishment.

Some species other than those whose varieties have been mentioned have valuable traits. They are of special interest to the geneticists in developing hybrids. The lovely and unusual 'Donation' is the result of a cross between *C. saluensis* and *C. japonica* var. *donckelari.* The Williamsii Hybrids, which have come from England in recent years, indicate that there is an open field for future enthusiasts in the camellia world.

NATURALIST (Continued from page 135)

honorary title of Doctor of Science. He is quoted as saying, with his typical, quiet humor, "Now, after all these years, I can stop explaining to people why they must not call me 'Doctor'."

One may trace the development of his philosophy, punctuated by a dry and sometimes wry sense of humor, by perusing the slim volume of verse—seventy-three poems and nine fragments—penned at various intervals during his lifetime: *Gathered Leaves, green, gold and sere,* published in his eighty-fourth year at the request of his three children, each of whom reflects one of the many interests of the naturalist father. It was Mrs. Palmer who carefully salvaged these fragile scraps from odd nooks and corners of the old home, where some had lain forgotten for decades.

In an era when specialization is the order of the day, few indeed are those who preserve through life a youthful zest for inquiry into all phases of nature. The passing of Mr. Palmer brings to an end an epoch that contributed much of knowledge to this broad area.

NUTRITION PROGRAM (Continued from page 134)

in every possible way the development of methods of processing that will produce a cheap source of protein for human consumption.

Soy protein is the one major source of plant protein which by itself appears to be quite adequate as a protein source for children, provided the soy flour is processed properly. It has been established that several producers in the United States can furnish edible soy flours of good nutritional value as far as the protein is concerned and at relatively low cost. There are possibilities of developing similar supplies in a number of countries which produce soybeans and which have protein malnutrition problems (for example, Brazil, Indonesia, Taiwan). Soy flour is currently being used commercially as the protein source in complete infant foods in the United States and in commercial infant food supplements in other countries. In view of the increasing availability of edible soy flours, the production of foods based on these products will receive serious consideration. Recently a new type of soy milk, which has great promise, was developed for UNICEF. It may point the way toward a somewhat similar peanut milk.

What are some of the practical applications of the new protein-rich foods? Here is one derived from cottonseed flour. In October, 1960, I visited Guatemala and El Salvador to confer with local authorities and the Director and personnel of the Institute of Nutrition for Central America and Panama, which was originally started by the World Health Organization. This Institute had been working on a new protein-rich food for more than eight years and had developed a product called Incaparina. It is composed of cottonseed flour, the principal source of protein, ground corn, ground sorghum, yeast, calcium carbonate, and Vitamin A. It has a protein content of 27.5%. It is a dry powder put up in polyethylene, a package of seventy-five grams being sufficient to supply the protein need of a child for a day. The product is heated after the necessary quantity of water has been added, often with some flavoring, and is consumed as a liquid known as atole. It may be added to stews or other foods. It thus fits into the diet of the Latin American countries. Extensive tests have shown that Kwashiorkor can be cured in six weeks with Incaparina as a principal food and without medication. This product effects a cure of Kwashiorkor virtually as well as milk. The cost is within the reach of the lower-income group; and when it is produced in volume, the cost is low for a government-sponsored school or other institution, or for group feeding. This project is now in the early stages of production, distribution, and promotion by industry.

Sesame flour ranks very high, but at present is almost unavailable in substantial quantities, even though it is grown and is popular as a cereal flavor in many areas. A good start, however, has been made in using sesame flour in new foods for children.

Peanut flour has received major attention primarily because of the availability of large quantities of low-cost peanut presscake in many countries, and because the technology of producing edible peanut flour appears to have been developed to a satisfactory state. UNICEF is currently providing supplemental equipment for two peanut-crushing plants in India to enable production of edible peanut flour, and it is supporting field trials of a peanut-flour–milk-powder mixture in an African country. A trial-production batch of peanut flour produced by solvent extraction is undergoing field trials in South America.

It has been recognized for many years that the protein of peanut flour by itself is deficient in some of the amino acids that are essential in the diet, and thus should not be provided as a sole source of protein. However, by suitable mixture with other protein sources, it can serve as a valuable supplement to some diets. Studies in England, Nigeria, and India have indicated that mixtures of eighty per cent of peanut flour and twenty per cent of milk powder are of good nutritional value. Mixtures of peanut flour with millet and fish flour have shown promise.

In India, during October and November, 1961, I had the privilege of studying the use of peanut flour for child feeding. In that country and in many parts of the world, peanuts are known as groundnuts. The total production of peanuts in India is five million metric tons annually, and peanut oil for food, soap, and detergents is extracted from a large proportion of the crop.

The presscake left after the extraction of the oil is used

(Continued on page 143)

STARTING FROM SCRATCH— THE BOTANIC GARDEN AT LAE

By J. S. WOMERSLEY

Mr. Womersley, who is Chief of the Division of Botany, Department of Forests, Lae, New Guinea, prepared the following for presentation at the Symposium on "Tropical Botanic Gardens" in the Tenth Pacific Science Congress, held at the University of Hawaii, Honolulu, August 21-September 6, 1961, and sponsored by the National Academy of Sciences, the Bernice Pauahi Bishop Museum, and the University of Hawaii. The paper was read by Dr. Constance E. Hartt, Senior Physiologist of the Experiment Station, Hawaii Sugar Planters' Association, Honolulu. Dr. Hartt, who is also Secretary of the Hawaiian Botanical Gardens Foundation, Inc., was Chairman of the Symposium.

THE FIRST BOTANIC GARDEN in the New Guinea area was established in Rabaul on New Britain about 1910 by the government of the then German possession of Kaiser Wilhelms-land and the Bismark Archipelago. This garden was further developed by the government of the Australian Mandate of New Guinea after the 1914-1918 war. Under the Department of Agriculture, this garden became a plant introduction and distribution center. In December, 1938, a list was published in the *New Guinea Agricultural Gazette* that enumerated four hundred and forty-nine species in cultivation; propagating material could be supplied of three hundred and five of these species.

This list related to plants in cultivation up to 1936, for during that year volcanic activity within the township of Rabaul destroyed much of the gardens. Subsequently, the ravages of the Pacific War brought about the complete destruction of the botanic garden and the town.

During the Pacific War an Australian army forestry company had headquarters at Lae, on the north coast of the mainland of New Guinea. Here the nucleus of an herbarium and botanical nursery was established under the guidance of the Government Botanist for Queensland. After the cessation of hostilities, civil administration was resumed during 1946, and the herbarium at Lae came under the control of the Department of Forests with myself, J. S. Womersley, as Forest Botanist.

The building itself was most unsuitable for an herbarium, and as it was located on native-owned land, it was necessary to seek a new site.

Prewar Lae was a small settlement of some fifty persons who lived and worked near the airstrip and small ships' harbour. The resumption of civil administration, the return of private enterprise, and a rapid expansion in air transportation demanded a completely new town. This has now been effected with the provision of some one hundred and forty acres, right in the center of town, for the Department of Forests as headquarters for the Division of Botany and as a botanic garden for the Territory of Papua and New Guinea.

Lae is situated near the mouth of the large valley-system drained by the Markham and Ramu Rivers and is flanked by high mountain ranges rising almost directly from the sea. The narrow coastal shelf consists of alluvium in grades from coarse boulder-gravels to very fine sands and silt.

Left. Indigenous unidentified species of *Pandanus* with epiphytic *Schefflera* sp. in the Botanic Garden at Lae. Center. Artificial lake is stocked with fish, *Tilapia mozambiqua*, and supports a dense growth of *Myriophyllum* sp., *Nymphaea nelumbo*, and *Acorus calamus*. The rain-forest backdrop is used as a planting ground for suitable species from this habitat. Right. *Inocarpus fagiferus*, an indigenous tree of swampland, grows very well on the banks of streams at Lae.

Some stiff blue clays are apparently the site of old mangrove swamps. Recent orogenic movements of the surroundings have produced a series of uplifted terraces and erosion scarps. The topography is one of extreme youth, and earth-movement is still taking place.

The climate is largely controlled by the prevailing southeast trade winds and the northwest monsoon. It may be described as warm, moist, and equable.

One aspect of climate peculiar to the equatorial tropics is the uniformity of the length of day. In Lae, 6° 30″ S of the equator, the solar year may be divided into two equal periods from March 10 to September 20 to March 10. On these dates day-length, as calculated from the beginning-of-daylight and end-of-daylight graphs used by the Civil Aviation authorities, is exactly twelve hours. From March to September the days slowly shorten to eleven hours and forty-one minutes on June 20. From September, day-length increases to a maximum of twelve hours and thirty-two minutes on December 26. The total solar amplitude is therefore only fifty-one minutes. This is in sharp contrast to conditions on even the tropic of Cancer or of Capricorn, where the amplitude amounts to some two and a half hours.

The practical effect in horticulture of uniformity of day-length is that many plants from New Guinea, even from temperate climates, do not establish themselves well in temperate latitudes and also that many plants adapted to a fluctuating length of day in temperate latitudes do not thrive in the tropics. Growth of some plants is satisfactory, but the stimulus to initiate flowering or formation of storage organs is lacking.

The existing vegetation of the Botanic Garden included a belt of damaged rain forest fringing a moderately fast-running stream, an abandoned coconut plantation, a small pineapple farm, secondary growth with tall coarse grasses, including *Saccharum, Sorghum, Eulalia,* and *Imperata,* and some swampland adjacent to the stream. First, in planning the development of the area, it was agreed that the damaged rain forest should be left intact, and that every effort should be made to arrest further damage by sun-scorch on the exposed edges and by unlawful cutting of the forest for sites for native gardens. Secondly, we examined the swampy margins of the stream and decided whether drainage and filling were possible, or alternatively whether clearance of the stream and its edges for the establishment of open-water surfaces and the introduction of weed-eating fishes was practical. Third, all secondary growth was cut by the effective, although inefficient cutting-tool known as a sarif, which is wielded with a sweeping action. Then very irregular areas were plowed and leveled, or used for a crop of rice.

Edges of the roads through the rain-forest section of the gardens are covered with indigenous aroids and palms. The large, incised leaves in the center are those of *Artocarpus altilis.*

By 1959 this initial program had been completed on almost all of the original sixty-four acres, and much of the additional eighty acres brought to the state where mechanical mowing of grass areas is routine. As each small area was developed, planting proceeded.

Next our attention was turned toward the construction of a permanent nursery-yard, plant propagating house, orchid-growing racks, two foliage-plant houses, and trellises for heavy climbers. We have almost four thousand square

Shelter and paddling pool blend into the natural beauty of the Botanic Garden. *Platycerium wilhelminae-reginae* on tree at right.

Vanda hybrids are grown under half shade, in earthenware pots or on blocks of tree-fern fibre collected locally from *Cyathea contaminans*.

Australian black swans and the indigenous water-lily, *Nymphaea nelumbo*, grace a pond in the Botanic Garden at Lae.

feet of nursery beds for the germination and establishment of seedlings of tree species, many of which are given away to plantations and grazing properties, to Administration outstations and patrol posts, or used for street tree plantings. Cuttings of ornamental plants are also grown in quantity for distribution to the public.

For raising delicate seed or species of which only limited seed is available, an insect-proof house with natural-colored Fiberglass roof has been constructed. The Fiberglass has a great advantage over ordinary glass in that infra red rays are absorbed, leading to a marked reduction in the temperature inside the house without an appreciable loss of light intensity. This house is also used to raise foliage plant cuttings, leaf cuttings, or anything that requires special care. It is also used as a local quarantine house for holding plants that have been released from the Territory Quarantine Station near Port Moresby.

The orchid collection has grown from some native species and plants obtained as cuttings to quite sizeable collections. These are held under high shade—the posts standing eight feet out of the ground with 2″ x ½″ slats at two-inch intervals. Most of the plants are mounted on blocks of tree-fern fiber. *Cyathea contaminans* is the species; the lower three to four feet of its trunk provide a dense mass of interwoven fibers. Many orchids do well on this material, but we now find that plants grown in broken brick in terra-cotta pots are making better growth under our ever wet and humid conditions.

Some success has been achieved with cattleyas and their relatives when they are grown under a glass roof and watering is controlled. *Vanda, Arachnis,* and related orchids are grown on 4″ x 2″ or 4″ x 4″ hardwood posts, around the base of which is a bed of well-rotted cow manure, leaves, old cocoa pods—in fact, any organic rubbish that will decay. Broken pieces of tree-fern fibers are specially advantageous in ensuring good drainage. Until recently we experienced considerable difficulty in providing adequate growing space in full sun for the vandaceous collection. This has been overcome by a system of terraces.

A potting shed, soil-storage bins, machine sheds, and workshop complete the permanent buildings. A large storage-building is shared with the other sections of the Division of Botany for holding fertilizers, building materials, pots, and other supplies.

The foliage-plant collections are housed in a lath-house one hundred by forty feet and in an octagonal lath-house of the same floor area but incorporating a small pool. Substantial trellises have been constructed to support the strong-growing climbers.

Plant quarantine in Papua and New Guinea is handled by the Department of Agriculture in a quarantine station located near Port Moresby. The Port Moresby region is an atypical portion of New Guinea, enjoying a strictly monsoon climate with nine months of dry season and three months of fairly intensive wet. Facilities for plant propagation are limited so that introductions are not always successful. There are strong arguments for maintaining a strict quarantine control over plant introductions to the Territory in view of the great importance of agricultural crops to the economy of the country and the predominating dependence of native people on subsistence agriculture.

As Lae is the center for considerable agricultural production, and the climatic conditions would certainly favor the spread of any newly introduced disease, the Department of Agriculture has not agreed to representations for the establishment of a quarantine glasshouse at Lae. The arguments cannot be disputed, but the loss of desirable plant material, both as seeds and rooted cuttings, has been considerable. We have attempted to have the plant propagating facilities at the present quarantine station improved to a point where the climatic barrier will not be so severe, at least within the propagating houses.

Within the Botanic Garden, a small fauna section has been established in which specimens of New Guinea birds and animals may be seen by visitors. The crowned pigeon, two species of birds-of-paradise, several parrots, and two species of tree-climbing kangaroos are kept, as well as several pairs of the Australian black swan. The wild fauna of the gardens is extensive but not catalogued. The local bird-of-paradise *(Paradisea augustae victoriae)* nests here.

This children's paddling pool was constructed in the Botanic Garden by the Rotarians of Lae.

The labor force is entirely indigenous. Most of the native people are unskilled . . . little success has been achieved in training labor in horticultural practices. This is probably because of the very low standard of horticulture practiced in subsistence agriculture in village gardens. Unlike the people of southeast Asia, the average New Guinean has no skill in grafting, marcotting (a form of air-layering), or establishing difficult cuttings.

Two expatriate staff are directly employed in supervising the work of the indigenous staff of forty. One officer is concerned with development and maintenance projects such as road and path construction, building, drainage, supervision of machinery. The other officer is concerned with the collections of living plants, the control of the nursery, and the placement of plants in the garden. The labeling of the living collections is also his responsibility, but difficulty has been experienced in implementing a satisfactory system because of the lack of suitable indigenous labor to be trained in lettering.

A few thoughts are offered on the role of a botanic garden in an underdeveloped country such as New Guinea. Two viewpoints are relevant. Probably the more important is that of the public who may see the development of a botanic garden as a move to deprive them of land that is valuable for building blocks, industrial purposes, agriculture, and sporting facilities. It is absolutely essential, therefore, that a botanic garden should be able to justify itself in the eyes of the general public, and this is usually and probably most effectively achieved if the garden can be made a place of aesthetic recreation and education. Only when a botanic garden is financed from private sources would it be possible to completely subjugate the public interest in favor of scientific pursuits. This is not the case in Lae . . .

Secondly, the attraction of any botanic garden to a botanist lies largely in seeing living plants of species not previously known to him or examples of vegetation not conveniently seen elsewhere. We must consider, in planning a new botanic garden, what natural features of the vegetation are peculiar to the locality and worth preserving, and also what species, either indigenous or rarely cultivated, can be grown successfully and shown to advantage. In Lae, we have answered this by deciding to maintain our rain forest in as nearly perfect condition as possible by the introduction to the existing forest of seedlings of indigenous rain-forest species. This has entailed extensive marginal plantings to prevent the ravages of sun-scorch on rain-forest species. Many of the species planted in this belt have been indigenous trees that are tolerant of bright sunlight when open-grown. Some remarkable growth rates have been achieved with individual trees. However, in the close planting, little or no under-story shrubs and trees have appeared, so it will probably be necessary to make plantings of suitable species of shrubs and also aroids to build up the under growth.

For specimen plants, emphasis has been placed on indigenous orchids, aroids, and ferns. In association with the herbarium collections, seeds of many indigenous species are collected for planting in the Botanic Garden and for distribution to correspondents. Seed exchange is a problem for a young garden, partly because of the lack of a comprehensive catalogue of the species in cultivation, doubtful names, and sometimes, with seed collections of indigenous species, no reliable name. Requests for seeds are kept on a card catalogue by species, and distribution is made as and when available in order of the receipt of the requests.

Establishing a tropical botanic garden in association with the technical work of the Division of Botany is an exciting occupation. With the continuation of stable political conditions, there is every reason to believe that Lae will develop into the botanical focus of the Southwest Pacific area.

NUTRITION PROGRAM (Continued from page 139)

to a small extent for animal feeds, but most of it is used for fertilizer largely because of rancidity which develops. It can be made into a flour with fifty per cent protein and suitable for human consumption. This involves changes in processing, which are the reason for the pilot-plant projects that will be in operation this year. Involved are agreements by the Government of India with two well-known Indian companies and with UNICEF aid in planning, engineering, and equipment.

It is becoming increasingly apparent that a variety of mixtures of cereal by-products and other food materials, with possibly some addition of fish flour or animal protein, will prove to be of good nutritional value and useful as protein-rich supplements.

In two years I have talked to both management and research personnel of many food companies in the United States, Latin America, Europe, and Asia, as well as research organizations supported by governments and foundations. I have been surprised and impressed by the results: the realization by industry and by individuals of the malnutrition prevalent in the world, and the desire to help in combating this malnutrition. Executives of food companies and food industry associations have called to express their concern and to offer their services.

I am conscious of the many situations I have encountered with protein-rich foods that appear similar to those I experienced with frozen foods. The development of protein-rich foods is in the initial stages; they will, I believe, have an important place in the world's foods. But uppermost is saving the lives of children!

NEW ZEALAND REVISITED

By PIERRE DANSEREAU

Dr. Dansereau is Assistant Director (Botany) and Senior Curator of The New York Botanical Garden.

Continued from the May-June, 1962 issue

610519. DUNEDIN to BECK'S

Geoff has gone off to Australia for the annual meeting of the ANZAAS, and has let me use his car. As I am terrified of driving on the left side of road, I let Pim Sanderson do it. He is a graduate botany student, a slim, muscular, jovial fellow, with an accent that would amuse Michigan students uproariously (one provincialism seems stranger and more ridiculous to another than either to the metropolitan). A nice clear day that shapes the downs of Otago sharply. We stop along the roadside in the Shag Valley for tea out of a thermos. A herd of sheep swarms all around us, the musterers following them on slow horses, the numerous dogs prancing alertly. We talk of the weather—and what is more real? more important to these men with the blond shocks of hair, the creased leathery faces, the sky-blue eyes? One with a lame ewe across his saddle. Very upright fellows—not without affinity to Spain?

The homesteads are neat, with thin toy-like white picket fences around their paddocks, their quiet grazing sheep, their free horses wildly shaking their manes and running along the fence-rows. Black screens of pine very straight; yellow bare branches of willow in the bottomland.

The higher country (about two thousand feet) is treeless and yellow with fescue on rather skeletal soil. Mining scars here and there, great abandoned excavations and many adobe houses (soft flat bricks made out of the local friable ochre silt). This landscape not unlike the Aragon Plateau near Bello? Down into Central Otago at dusk and the search for Beck's, a dot on the map. A school, a few houses, and the White Horse Hotel. One-storey wooden house, chilly in the chilly night. Main corridor with linoleum, rooms with large concave beds covered with ugly pink chenille "comforter." The barman (owner?) very jovial in a stylized inebriate Irish style. Pim and I receive a drink and a good deal of talk. George Scott, who is staying with friends, joins us with his host Bill McConnochie, a sheep farmer. After another drink we drive to the McConnochie farm for dinner. This turns out to be quite something. The son, who is pushing fifteen not too awkwardly, has killed some mallards, and they have been prepared exquisitely by Mrs. McConnochie. She is a very accomplished woman, in touch with many world problems, a keen gardener with a good deal of botanical knowledge. Conversation does not lag. Vera Hayward (the University registrar's sister) also a guest and friend of the family. She has a sharp wit and much knowledge of the social evolution of this country. George's wife is sweet, shy and quiet although not bashful. Conversation is on farm economics and techniques, on communication and travel. McConnochie knows Canada where he was stationed for quite awhile during the war. In the cosy parlour next to the fire, with good food and plenty to drink, this evening has more warmth and substance than any metropolitan function.

610520. BECK'S — CASCADE CREEK

Very sharp morning. Snow in the air. Very mineral landscape of Central Otago ("Central" as they call it). Bill McConnochie sees us off. Road to Queenstown through Cromwell Gorge and Kawarau Valley. The blue-gray graywacke dissipates into dark sand on the shores. A skirt of very fresh-looking lupine grows on it and on the pebble and rock. Gorse and rose overwhelm the matagouri in their shade. The straw-blond fescue sings out in this gray symphony, and the lush spears of flax.

Queenstown somehow recalls Saratoga and the pleasures of resorts in the "Gay Nineties." A chill wind on the lake. A neat square and jetty and lots of good-looking exotic trees: eucalyptus and yet no suggestion of the Côte d'Azur; Douglas-fir and yet no resemblance to the Olympic Peninsula; mountain-ash, beech, and poplar and yet not like Europe at all.

Along Lake Wakatipa, with the sun off and on and sweeping the Remarkables with cold blue clouds and hard shadows. And then down to the plain again, to Mossburn and Te Anau.

We reach Cascade Creek, just before dark. Not expected, but treated to the best: hot soup, hot corned beef, and then —those uncannily chilly beds. (I ask for the "bridal suite" for George and Anne.) A jaunt in the darkening red beech forest, more ghostly green than before in the twilight. The unreality of our tread on the yielding trunks under the moss carpet. The multitudinous tiny leaves of the regenerating beeches and of the coprosmas, like glinting spots and floating specks before our eyes.

610521. CASCADE CREEK—HOLLYFORD VALLEY —TE ANAU

Dry tonight by the fire and in civilized company, having a genteel supper and a night cap at the Te Anau Hotel. But how wet was this day! George and Pim and I, wrapped in many sweaters and bearing an outer layer of oilskin (only fairly waterproof), head down the Hollyford Valley Track. Having crossed the suspended Moraine Creek Bridge, its wires as right (and silvery) as rain, we enter a very beautiful hardwood forest: silver beech and kamahi *(Weinmannia racemosa)* above, many araliads below, and ferns, ferns, ferns. The forest floor is stellate with the bursting crowns of silver-sided blechnum *(B. discolor);* the filmy ferns drip gently from every moss polster on the tree trunks. The powerful shaft of the rimu shoots to the top of the canopy, its delicate lycopod-leaves in falling wisps like an exploding rocket. Wet, wet, wet. Water in our shoes, sucked in from the saturated moss. Water on our face and shoulders, spilling from the hard leaves of the broadleaf and the spice tree, brushed on by the reclining tree ferns.

I should like to satisfy my curiosity about riparian vegetation. We make one stop on a gravel flat and head into

the wind-driven rain. Some collections, and records. (How hard it is to write.)

We have our lunch at a wayside camp. The owner has rather an interesting museum, with pioneer lore of various kinds: iron and wooden implements and tackle. A group of University of Otago students are playing ping-pong in the dark, damp, littered room. All the girls very sloppy-looking. Except one, in a low-cut flowery dress, a curlicued coiffure, and a Jane-Russell smile, who fits the wild-western atmosphere of the place. We are invited to the kitchen for a cup of tea. Our host, a silent, lonely, rather sad man, living in dampness and ugliness. No redeeming features: the butcher's calendar, tin containers with faded labels, torn lace curtains .

610522. TE ANAU — DUNEDIN

Rain has exhausted itself, and the landscape is bright with sunlight. Colder, too. We back-track to Te Anau Bush, near the entrance to the Fiordland National Park, and make two very useful stops. Rainfall here much lower; dry influence favours mountain beech *(Nothofagus cliffortioides)*. One stand is silver-mountain beech, and its ground is much disturbed by wild pigs ("Captain Cook's pigs"!) who have uprooted saplings and ferns. The other is pure mountain beech regenerating very vigorously. Epiphytic growth not conspicuous, a great deal of bare ground with leaf litter.

After a quick lunch in an Espresso Bar—where the cook

Porter's Pass (Canterbury) on dry eastern slopes with scrub vegetation of *Dracophyllum* and *Danthonia*.

speaks a little Italian (Monte Cassini?)—we are on the homeward trail.

610523. DUNEDIN

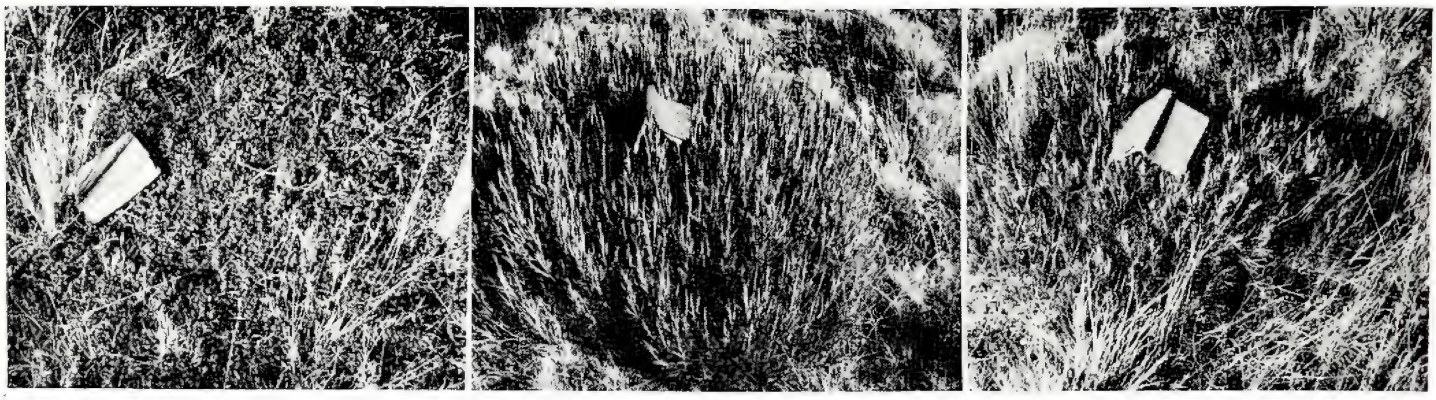
A minor shock: a bland notice from Montreal to the effect that our wardrobe trunks (picked up at our house in Montreal on March 28) have left Montreal on May 4. I dash downtown to find out that the S. S. Port Phillip, which carries them, is due here on June 26! We almost have a fit.

But I must calm myself since on this day I am to be introduced to the University Council. I sit next to the Chancellor in this distinguished mahogany horseshoe and am presented by him as a distinguished ecologist. He says he does not know what this is. I reply that I shall not have the impertinence to tell him, of all people, about distinction. As for ecology, jolly good excuse to get oneself in-

Left. *Danthonia* grassland with tufted *Dracophyllum* (species and hybrids). Dr. W. Philipson, Dr. E. Godley, Dr. P. Wardle.

Lower left. Torlesse Range, showing Castle Peak with scrubby *Nothofagus cliffortioides* at timberline, alternating with *Danthonia flavescens* tussockland. Lower down: *Festuca novae-zealandiae*. In foreground: induced grassland with *Agrostis tenuis*. Dr. Philipson.

Below. Cave Stream Flat, a small plateau at the foot of the Craigieburne Mountains. Grassland of *Festuca novae-zealandiae* with a great deal of *Cassinia vauvilliersii* and some *Dracophyllum*.



Left. The prostrate, alpine *Dracophyllum pronum* in the fescue grassland of Cave Stream Flat. Center. The erect, subalpine *Dracophyllum uniflorum* in the fescue grassland at Cave Stream Flat. Right. A semi-prostrate *Dracophyllum* in the fescue grassland of Cave Stream Flat, probably a hybrid of *D. pronum* and *D. uniflorum*.

vited . . . and so on. Tea and sandwiches and then a handshake with each member of the company. On occasions like these, I sometimes feel sorry for my American colleagues whose superstitious avoidance of ritual deprives them of some graces. Deprives them also of a valuable means of communication and expression.

V. CANTERBURY AND WESTLAND

610524. DUNEDIN—CHRISTCHURCH.

Pim Sanderson and George Scott drive us to the station. First-class is very comfortable, quite as good as our Pullman, really. But no dining-car. At all stops, a wild rush to "Refreshments" counter, where hot pies, tea, cake are handed out precipitately. Dishes may be carried aboard train, are collected periodically by pert stewardess. (Pert, did I say? Am I *Time*-writing?)

Sunny Otago downs framed in windows all day. Brisk walks on platforms. Newly painted ships in Timaru. Reading and work on Fiordland field notes. To me, always a happy time on trains.

The Godleys are at the station in Christchurch. Take us to Clarendon Hotel. We are the last in dining room. Rather a poor dinner, served up very fast and dispiritedly.

610525. CHRISTCHURCH—BEALEY'S

An impressive amount of talent has been mobilized to take us on a trip to the Westland. Eric Godley (Director of the Botany Division of the Department of Scientific and Industrial Research) has brought two of his bright young men. Bright they are: Peter Wardle and Ian Atkinson. Professor W. Philipson has taken one of his, Colin Burrows, and the Geography Department has sent Dr. Murray McCaskill. Eric has a landrover and Philipson a touring car.

We make several stops on the way to Arthur's Pass, to look at the contest of scrub and grassland on these hills that once had a good deal of mountain-beech forest. The *Dracophyllum* hybrids are particularly interesting. I make two mass collections. Lunch in a sunny and sheltered spot. The slanting light lacquers our faces orange and gold. The braided stream is the Waimakariri River. I remember that name, how it rang the first time, in 1949, and has echoed ever since. But it was summer then, and it is autumn now, with a tang in the air and the menace of frost.

At the height of Arthur's Pass we are shrouded in gray, ourselves black and white. I tread once more the patterned cushion bog. The *Donatia novae-zealandiae* is dense and tight like on Maungatua, but it is very much flatter (continental effect?). In a neighbouring ravine, one of the most spectacular plants is *Dracophyllum traversii*, as big as a *Dracaena* and more beautiful: a tall branched shrub with ringed branches (like a monocotyl!), ramified and ending in large recurved rosettes of hard green and red leaves. Dead inflorescences purple-black, rigid. Who knows this admiration for a plant? This thrill of beauty as in the presence of a woman. Must it (must she?) be unknown to draw the breath in this way. Or is it indeed a greater emotion to *know* what (who) it is? Not only lovely, but the loveliest, a princess no less!

The wetness pervades, drifts, clogs but does not settle, does not condense, does not actually fall. How this seems to suit the large blades of the mountain flax (*Phormium colensoi*) and the long curving leaves of the tussock grass!

Bealey's Hotel rather nice country cottage from the outside, but damp and cold inside. Fortunately, a hot-water bath and a congenial bar. At table we are requested by management to fill a table of six, so that two are sent to another table. (Why not four and four?) Evening in a deathly cold living-room. Some good discussions, interrupted (as far as I am concerned) by a periodic chill. Night-cap in bar is more cheerful.

610526. BEALEY'S—HARI HARI

Breakfast at 8 (not before and not after: dining-room door locked on our heels!). An omelette made out of an emetic powder. Very salty bacon. Coffee as it was in New Zealand twelve years ago. Service by a singularly wooden, although not ugly, girl.

It is raining, and I put on all my oily gear. We stop in the last stand of mountain beech, just a little below the pass (same place, very nearly, as my 1949 relevé). Trees a mere ten meters high, some subalpine shrubs beneath them (*Coprosma pseudocuneata, Phyllocladus alpina, Podocarpus nivalis, Pittosporum crassicaule, Dacrydium biforme, Senecio bennettii*). A great mantle of bryophytes.

On the west side of the divide (Peg Leg Creek) a tall *Senecio-Phyllocladus* scrub harbours several *Olearia* species and quite a hybrid swarm. I grab leaves very quickly, at random (so to speak: no numbers pulled out of a hat, mind you!). The blindness of my choice is caused by the rain and the hurry. It will not always be possible on this trip

to make formal relevés, although my hosts are of an exemplary patience. The descent towards Otina is very macaronesian,[1] with *Metrosideros umbellata* and *Weinmannia racemosa* forming dense forests on steep slopes. At the foot of Otino Gorge, as we emerge on a small plateau, we clamber back onto the escarpment on foot to inspect one such stand. Podocarps are almost absent (only *Podocarpus hallii*): *Weinmannia, Quintinia, Melicytus, Metrosideros, Griselinia, Pittosporum eugenioides* are the most important forest trees. *Cyathea smithii* is very conspicuous, with its enormous crown of delicately divided fronds and the apron of dried stipes that sheathes the upper part of the trunk. Big, tufted green and russet *Polystichum vestitum* and many other ferns, but no moss carpet. On the contrary, much bare, slippery ground. According to Colin Burrows: this is the *Quintinia-Weinmannia* forest; and upwards the following storeys: *Metrosideros-Weinmannia; Metrosideros; Libocedrus-Podocarpus hallii-Metrosideros*; subalpine scrub. This looks like a good example of association-segregates (sensu E. Lucy Braun).

No cut-lunch (= picnic lunch) today. We go to the Otina railroad station, a few minutes before the train (Greymouth-Christchurch) pulls out. Hot meat pies are still "on." I have one, and I munch at it leisurely. When I turn around, wanting another, the passengers have been whistled back to their seats, and the train is grinding off. The girls behind the counter have cleared everything away, are taking off their aprons, shovelling cookies into the frig, doors are slamming shut, lights are being turned out. I do not think they take eating very seriously. I do persuade one of the girls to get me another pie. It is quite good, really. But who knows?

As we reach the lower altitudes, the sky is clearing. Clumps of red beech (*Nothofagus fusca*) are to be seen along the upper edge of the Taramakan River. This is an outlier, for we are now in Holloway's famous beechless area, that considerable portion of the Westland where hardwood-podocarp forest dominates exclusively, and which (according to Jack Holloway) *Nothofagus* has not had time to recolonize since the end of the glaciation.[2] This will, of course, bear looking into more carefully. A complication is

Jacksons in the Westland, at low altitudes: a typical, dense, temperate rain forest of *Weinmannia racemosa, Metrosideros umbellata,* and *Dacrydium cupressinum.* Mists are frequent, rainfall approximates four hundred inches.

At the edge of the forest, in Kumara, *Dicksonia squarrosa* is very dense. Dr. Wardle.

the fact—so utterly different from our boreal history—that considerable orographic movement took place here during the Pleistocene. The New Zealand Alps are the youngest mountains in the world![3]

At Jacksons, rather a synthetic picture, posing a variety of problems. 1) Hills are covered by reasonably virgin forests of *Metrosideros-Weinmannia-Dacrydium cupressinum.* 2) Rata (*Metrosideros*) is being killed off by opossum. 3) Landslides are recolonized by a tall *Fuchsia* scrub, now losing its leaves. 4) *Nothofagus fusca* is present only on the valley floor. 5) Many abandoned farmsteads and gardens date back to the goldrush. Murray McCaskill has a good deal to say on this period and the traces it has left on the landscape. He has made a study of it as a geographer.[4] Also, his own family history is linked to this region. "This was my aunt's house," he says, pointing to clumps of still vigorous oaks and willows. A small structure three times the size of a privvy, but of more dignified architecture was the library of a gold-mining village. A library!

After a spell in a *Gahnia* bog, we push on to Hokitika and to Hari Hari. Our hosts are always very preoccupied with arriving on time for meals: no later than six o'clock. This worries them a great deal. The Hari Hari Hotel is quite pleasant. Our room is heated. Françoise and I decide that we jolly well shall have a bath before dinner. We come in late and are somewhat frowned upon. In a cozy little salon, we have quite a lively discussion on what we have seen today. A few other guests listen in for awhile but are soon frightened off by "hydrosere," "evolutionary opportunity," and fairly intimidated by "congeliturbation."

To be continued

1. With their customary restraint the New Zealand botanists did not point out to me that it was Macaronesia that was like New Zealand and not the other way around. May my Portuguese colleagues be likewise tolerant when I next return to Madeira!

2. John T. Holloway. Forests and climate in the South Island of New Zealand.—Trans. Roy. Soc. New Zealand, 82(2):329-410. 1954. This is one of the most important papers ever published anywhere on the subject of climatic change.

3. Maxwell Gage and R. P. Suggate. Glacial chronology of the New Zealand Pleistocene.—Bull. Geol. Soc. Amer., 69: 589-598. 1958. R. P. Suggate. Time stratigraphic subdivision of the Quaternary as seen from New Zealand.—Quaternaria, 5:1-13. 1960.

4. Murray McCaskill. The goldrush population of Westland.—N. Z. Geogr., 12(1):32-50. 1956. Also: Miner, merchant and mountain, a study in the political geography of Gold Rush Westland.—Proc. 2nd N. Z. Geogr. Conf., Christchurch, Aug. 1958, pp. 3-11.

BRIEF NOTES ON RECENT BOOKS

By ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

PLANTS, GARDENS AND GARDEN PRACTICES

BULB AND CORM PRODUCTION, 4th ed. (Great Britain. Ministry of Agric., Fisheries and Food Bull. No. 62) 74 pages, illustrated. British Information Services, New York. 1961. Paper, $1.05.

Information based on recent experiments, notably in The Netherlands, including disease and pest control. Particular emphasis given to bulb production and care in Great Britain. Valuable appendix with storage schedules for specific flowering dates.

EVERGREENS. Gillespie, Norvell. 48 pages, illustrated (part colored). California Chemical Co., Ortho Div., San Francisco. 1961. Paper, $1.00.

This slim booklet is for the beginning gardener. In it may be found "timely tips" for selection, planting, care, and understanding of some of the popular evergreens.

JAPANESE GARDENS AND MINIATURE LANDSCAPES: A HANDBOOK. 84 pages, illustrated. Brooklyn Botanic Garden. 1961. Paper, $1.00.

Kan Yashiroda, now residing in Japan but formerly a fellow at the Brooklyn Botanic Garden, is the guest editor of this informative booklet. He, himself, has written some of the text and has translated several articles which were contributed by prominent Japanese horticulturists.

THE PERENNIAL BORDER AND ROCK GARDEN. Fillmore, Roscoe A. 291 pages, illustrated, indexed. Ryerson Press, Toronto. 1961. $5.50.

A Canadian nurseryman, with many years' experience in growing plants in Nova Scotia, has written a practical guide. Gardeners in our northern states will find useful data on hardiness of certain species and varieties of plants.

ROSE GROWING SIMPLIFIED. Milton, John. 128 pages, illustrated (part colored), indexed. Hearthside Press, New York. 1962. $3.50.

A clearly written text, with sensible recommendations for the inexperienced gardener.

ROSES IN COLOR. Edland, Henry. 71 pages, colored illustrations. (A Studio Book) Viking Press, New York. 1962. $3.50.

An attractive little book (originating in England) with illustrations in color of twenty-four varieties of roses (seven of which are not listed in *Modern Roses V*) and descriptive notes. The introduction is devoted to a brief history of the rose in art, literature, and horticulture.

SIMPLE, PRACTICAL HYBRIDISING FOR BEGINNERS. Thomas, D. Gourlay. 127 pages, illustrated, indexed. St. Martin's Press, New York. 1962. $3.95.

A simple introduction to an intriguing subject—that of plant breeding. Not comprehensive, but it will serve as a good starting point.

INDOOR GARDENING

THE ART OF TRAINING PLANTS. Ballard, Ernesta Drinker. 128 pages, illustrated (colored front.), bibliography, indexed. Harper and Bros., New York. 1962. $4.75.

Decorative plants which can be grown in containers, such as pots, tubs, planters, and trays, are included. Special pruning and training techniques are discussed and illustrated for bonsai, topiary, standards, cascades, and even for ungainly overgrown house plants. A useful companion to Mrs. Ballard's earlier publication, *Garden in Your House* which appeared in 1958.

AN EASY GUIDE TO AFRICAN VIOLETS, rev. ed. Meachem, William L. 66 pages, illustrated (part colored), indexed. Hearthside Press, New York. 1962. $2.50.

For the inexperienced grower of African violets. A new, enlarged edition with added material on soilless culture, pests, summer care, and varieties.

THE ENCYCLOPEDIA OF HOUSE PLANTS. Jenkins, Dorothy. 328 pages, illustrated. Bantam Books, New York. 1962. Paper, 95 cents.

An amazing coverage in a pocket-size book. Includes common as well as exotic types; also sections on herbs, seeds, bulbs, cuttings, growing under artificial light, plants for offices, planters, "fun for children," and seed-germination tables.

HOME ORCHID GROWING, 2nd ed. Northen, Rebecca T. 320 pages, illustrated (part colored), bibliography, indexed. D. Van Nostrand Co., Princeton, N. J. 1962. $10.95.

Mrs. Northen's excellent new edition is almost twice the size (in text, illustrations, and over-all measurements) of her original work which appeared in 1950. Much has happened in the orchid world during the past dozen years —new culture techniques, new pest controls, new improved equipment.

HOW TO GROW AFRICAN VIOLETS, 3rd ed. Rector, Carolyn K. 64 pages, illustrated, indexed. (A Sunset Book) Lane Book Co., Menlo Park, Cal. 1962. Paper, $1.75.

The appearance of a revised edition of an old favorite is in itself a recommendation. Pest controls have been updated and there is a new chapter on species of *Saintpaulia*.

MODERN GUIDE TO HOUSE PLANTS. Warren, Ann. 107 pages, illustrated, indexed. (Dolphin Handbook) Doubleday and Co., Garden City, N. Y. 1962. Paper, 95 cents.

A handy little paperback for the layman indoor gardener. Especially helpful are the tabulations of scientific and popular names; specific light requirements; methods of propagation, and degree of "ease of cultivation."

PROPAGATING HOUSE PLANTS FOR AMATEUR AND COMMERCIAL USE. Nehrling, Arno and Irene Nehrling. 282 pages, illustrated, indexed. Hearthside Press, New York. 1962. $4.95.

Most of the material in this book can be found in other available publications. However, a compilation of this kind is always useful for those who do not have an extensive library. The list of commercial sources of house plants and supplies is currently most helpful.

FLOWER ARRANGEMENT

FLOWER ARRANGING BY TAT. Shinno, Tat. 237 pages, illustrated, Tat's Inc., Walteria, Cal. 1961. $8.50.

Tat Shinno's *Flower Arranging* reflects the author's rare qualities of teacher and artist. A truly fine presentation of the many facets of flower arrangement, both Oriental and Occidental.

SOILS

E. W. HILGARD AND THE BIRTH OF MODERN SOIL SCIENCE. Jenny, Hans. 144 pages, port., bibliography, indexed. (Agrochimica No. 3) Farallon Publications, Berkeley, Cal. Paper, $2.00.

Well-documented account of the achievements and the life of Professor Eugene Woldemar Hilgard (1833-1916), who made tremendous contributions to the study of soil geography and soil conservation.

SOIL MANAGEMENT FOR CONSERVATION AND PRODUCTION. Cook, R. L. 527 pages, illustrated (part colored), bibliography, indexed. John Wiley and Sons, New York. 1962. $9.95.

Primarily written for agricultural college students interested in modern soil management. Regional soil problems and cropping systems of the North, South, East, and Great Plains are discussed. An authoritative and comprehensive treatment.

INSECTS AND DISEASES

CROP SPRAYING SIMPLIFIED. Bradford, Michael. 113 pages, illustrated, indexed. Charles C. Thomas, Springfield, Ill. 1961. Paper, $2.25.

British books, excellent though they are for British gardeners, have a limited usefulness in this country when proprietary names of herbicides, fungicides, and insecticides are mentioned. The majority of these products are not procurable in the United States.

PEST CONTROL AND WILDLIFE RELATIONSHIPS. Part I: Evaluation of Pesticide-Wildlife Problems, 28 pages; Part II: Policy and Procedures for Pest Control, 53 pages. National Academy of Sciences, National Research Council. Committee on Pest Control and Wildlife Relationships, Washington, D. C. 1962. Each part, Paper, $1.25.

LAWNS AND WEEDS

SEED IDENTIFICATION MANUAL. Martin, Alexander C., and William D. Barkley. 221 pages, illustrated, bibliography, indexed. University of California Press, Berkeley. 1961. $10.00.

Over six hundred different "weed" seed species are represented in photographs and drawings and described in non-technical words. The authors, interpreting "weeds" in a broad sense, have included "many harmless wild plants" and also a number of plants which are of value to wildlife and useful as soil binders.

TURF MANAGEMENT, rev. ed. Musser, H. Burton. 356 pages, illustrated, indexed. McGraw-Hill Book Co., New York. 1961. $10.95.

(Continued on page 156)

NEWS, NOTES, and COMMENTS

At the Annual Meeting, held in the Snuff Mill on May 22, 1962, Mrs. George Emlen Roosevelt, Rodney Wilcox Jones, and Judge Charles A. Loreto were elected members of the Corporation.

Mrs. James Cox Brady, Dr. Lyndon O. Brown, Leonard J. Buck, Mrs. Charles Burlingham, Frederick S. Moseley, Jr., Mrs. Hermann G. Place, Michael Rapuano, Mrs. John L. Senior, Chauncey Stillman, and Oakleigh L. Thorne were re-elected as trustees.

Sherman Baldwin and Dr. Wendell Holmes Camp* received Distinguished Service Awards.

Robert F. Kolkebeck, Assistant Director (Administration), read the citation that accompanied the award to Mr. Baldwin:

Sherman Baldwin was born at Bellport, Long Island, on July 13, 1897, the son of Henry de Forest and Jessie Baldwin. After receiving his LL.B. degree from Yale in 1922, he was admitted to the New York Bar in 1923; since then, he has distinguished himself in the legal profession, having succeeded his father as a member and senior partner of the prominent law firm of Lord, Day and Lord.

Mr. Baldwin was elected to membership on the Board of Managers of The New York Botanical Garden and appointed its counsel on October 2, 1947, to succeed his father who in turn had served the Garden not only as a member of the Board but also as its counsel for over twenty-six years, besides holding the office of Vice President from 1927 until his death on May 18, 1947. When one reflects on the impressive span of service rendered to The New York Botanical Garden by the Baldwins covering a period of over forty-one years, it is evident how deeply the Garden is obligated to the family now represented by this respected friend and colleague.

Mr. Baldwin has responded just as generously to calls from others. He served his home town of Redding, Connecticut, as Chairman of its Board of Finance from 1947 to 1953. His interest in education is shown by his willingness to serve as a trustee of Brearly School in New York and of Pomfret School in Connecticut. In an even larger way he now serves as a trustee of Vassar College and of the American Academy in Rome, the latter having been organized for the purpose of offering fellowships and grants to graduate students in its schools of fine arts and classical studies.

In recognition and appreciation of his great interest in and service to botany and horticulture through The New York Botanical Garden, this Distinguished Service Award is gratefully presented to Sherman Baldwin, outstanding citizen and eminent lawyer.

Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Botany, read the citation that accompanied the award to Dr. Camp:

Dr. Wendell Holmes Camp, since 1954 Head of the Department of Botany at the University of Connecticut, was born in 1904 in Dayton, Ohio. In 1925 he graduated from Otterbein College, which also awarded him the degree of Doctor of Science (*honoris causa*) in 1951. He did his graduate work at Ohio State University, receiving the M.S. in 1926 and the Ph.D. in 1932. After teaching botany at Ohio State University for several years, Dr. Camp came to The New York Botanical Garden in 1936 as a member of the curatorial staff and remained until 1949, when he joined the staff of the Philadelphia Academy of Natural Sciences. During his many years in New York and his five years in Philadelphia, Dr. Camp was associated respectively with Columbia University and the University of Pennsylvania.

Dr. Camp contributed much, and in many ways, to the fields of botany and horticulture, through research work done primarily at The New York Botanical Garden. He was a moving force in the organization of the American Society of Plant Taxonomists, of which he has served as secretary and treasurer, and also as president. As vice president of the Section of Nomenclature and as chairman of the Committee on Nomenclature of Cultivated Plants of the Seventh International Botanical Congress, and as a member of the Nomenclature Committee of the American Horticultural Council, Dr. Camp wielded much influence in the clarification and codification of names of our cultivated plants. His researches on the nature of species and his published philosophical considerations of the results have done much to broaden the field of taxonomy. He founded *The Taxonomic Index* and served as its editor for twenty years. He has carried on very extensive field work in the western hemisphere, especially as a member or leader of expeditions to the Pacific Northwest, to southern Mexico, to the Caribbean, and to South America.

Dr. Camp's scientific interests, training, and activities are so remarkably broad that they deserve mention here. Like Dr. Nathaniel Lord Britton, Dr. Camp developed his first scientific interests in geology and paleontology. Although his first botanical research was in plant anatomy, early in his career he became a leader in the field of plant taxonomy. His significant research on blueberries related cytological data to horticultural problems, and his investigations on beeches emphasized the importance of ecological and phytogeographical data.

In recognition and appreciation of his great contribution and service to botany and horticulture through The New York Botanical Garden, this Distinguished Service Award is gratefully presented to Dr. Wendell Holmes Camp, a distinguished scientist, author, explorer and administrator.

Charles B. Harding presented his report as President and Dr. William S. Steere his report as Director of The New York Botanical Garden. These reports were mailed to members.

Activities of the Director and Staff. During the past several months, Dr. William C. Steere, Director, has attended meetings of Commissioner Allen's Committee on Museum Resources in New York City; of the Council of New York State Association of Museums in Albany; of the Governing Board of American Institute of Biological Sciences in Boulder, Colorado; the annual meeting of Carnegie Institution of Washington in Washington, D.C.; meetings of the Executive Committee of Biological Abstracts in Philadelphia, and of the Steering Committee of the Biological Sciences Curriculum Study in Boulder, Colorado.

Dr. Steere made the opening remarks at Members' Evening on April 4 and gave his annual report as Director at the annual meeting on May 22. He attended the luncheon of the Cultural Institutions Group in New York City and the dedication of the Nelson Biological Laboratories at Rutgers University, and made a site visit to Cornell University for the National Science Foundation.

Dr. Pierre Dansereau, Assistant Director (Botany) and Senior Curator, gave an illustrated talk on "The Landscape of New Zealand" at Members' Evening. Dr. Dansereau has been appointed to the Committee on the Brooklyn Botanic Garden award for interpreting botany to the public.

Virginia Weadock, research assistant to Dr. Dansereau, is spending two weeks this month in Iceland, where she is acting as secretary to the Symposium on North Atlantic Biota. The symposium is being sponsored by the NATO Advanced Study Institutes Programme under the auspices of the University of Iceland and the Museum of Natural History, Reykjavík, and is organized by Dr. Askell Löve of the Université de Montréal, Canada. Miss Weadock plans to join a post-conference tour to the ancient Viking settlements in southern Greenland, and subsequently will spend two weeks visiting friends and colleagues in Europe.

T. H. Everett, Assistant Director (Horticulture) and Senior Curator of Education, returned the end of May from a five-week "round-the-world garden tour" on which forty-nine members of the Garden Clubs of America were led by Mr. Everett, Mrs. Robert Byloff and Mrs. Frederic Legler of the Garden Club of America, and Lars-Eric Lindblad of Lindblad Travel, Inc.

Dr. Harold W. Rickett, Bibliographer and Senior Curator of the Library, attended a meeting of the Advisory Committee of the Hunt Botanical Library of Carnegie Institute of Technology in Pittsburgh. He gave a talk on botanical terms before a meeting, in White Plains, New York, of the Ninth District of the Federated Garden Clubs of New York State, Inc.

Dr. P. P. Pirone, Senior Plant Pathologist, attended the tenth annual Symposium on Air Pollution at Wagner College, Staten Island; was interviewed for a CBS broadcast; and participated in the Clare Ford Garden Forum, held at Henry Ford Museum, Dearborn, Michigan. Dr. Pirone's subject was "Plant Pests and Diseases."

Dr. Richard M. Klein, Alfred H. Caspary Curator, presented papers on his researches at the meetings of the Northeast Section of the American Society of Plant Physiologists, held at Rutgers University, and at the annual meeting of the Society for Economic Botany held in Washington, D. C. He will present a paper at the meetings of the American Institute of Biological Sciences to be held in Corvallis, Oregon, next month.

Sister M. Richardis, O.P., a graduate student in Dr. Klein's laboratory, presented a paper on her thesis research on seed germination at the meeting of the Northeast Section of the American Society of Plant Physiologists, held at Rutgers University.

Dr. Arthur Cronquist, Curator, attended the centennial of the United States Department of Agriculture as representative of the American Society of Plant Taxonomists and The New York Botanical Garden. Dr. Cronquist will serve as an advisor for films on botany for the

*Dr. Camp suffered a cerebral hemorrhage on May 27—apparently, and fortunately, not too damaging.

Members of the Advisory Council attended a luncheon-meeting at The New York Botanical Garden this past spring. They viewed the exhibits in the Museum and Administration Building, so artistically arranged by the Display Committee, and started on a tour of the gardens. Below. Advisory Council members inspected some of the labor-saving equipment recently acquired by the Gardening Department which the Council generously furnished funds.

National Science Foundation. During the last two weeks of June, Dr. Cronquist lectured on botany at the Summer Institute for high school biology teachers, held at Eastern New Mexico University, Portales.

Dr. David Rogers, Curator of Economic Botany, lectured at City College in New York City on "Evolution of Cultivated Plants." He recently visited the Gray Herbarium at Harvard University, and attended the annual meeting of the Society for Economic Botany, held in Washington, D. C.

Dr. Clark T. Rogerson, Curator for Cryptogamic Botany, attended the dedication of the Nelson Biological Laboratories at Rutgers University, as did Dr. Annette Hervey, Senior Research Associate. He also participated in the summer meetings and field trips of the Northeastern Section of the Botanical Society of America at the University of Delaware and Longwood Gardens.

Miss Elizabeth C. Hall, Sarah Gildersleeve Fife Research Librarian, has been elected an honorary member of the Orange and Dutchess Counties Garden Club, in appreciation of her many contributions in the field of botanical and horticultural research.

Dr. H. A. Gleason, Head Curator Emeritus, is engaged in research at the Garden, for the summer months.

Robert Jones was appointed Administrative Librarian, effective July 1, 1962. Mr. Jones received Master of Library Science degree from Rutgers University in 1960, and has served in various capacities in libraries in New Jersey.

Mulford Martin has been appointed Honorary Curator of Bryophytes at The New York Botanical Garden. Since his retirement two years ago as Associate Director of Libraries of New York University, Mr. Martin has been a volunteer worker in the Cryptogamic Herbarium.

Mrs. Charles Burlingham has been appointed Honorary Curator of Museum Exhibits, in appreciation of her great talent and devoted service in arranging the displays in The Museum and Administration Building.

Mrs. Leighton H. Coleman has been appointed Chairman of the Volunteer Associates of The New York Botanical Garden.

M. Peter Glass has been awarded the Gertrude S. Burlingham Scholarship in Mycology at The New York Botanical Garden for the summer of 1962. Mr. Glass, who is a graduate of Princeton University, will study the nature of zygotropic attraction in *Mucor hiemalis*.

Visitors to the Garden. The following have visited the Garden in recent months:

Dr. Hansgeorg Pag, Biologische Bundesanstolt, Berlin-Dahleim, Germany.

Dr. K. Zackariah, Biology Dept., Princeton

University, Princeton, N. J.

Dr. W. M. Laetsch, Biology Dept., Long Island Center, State University of New York.

Dom Pirone, Biology Dept., Hunter College, New York, N. Y.

Dr. R. R. Stewart, University of Michigan, Ann Arbor, Mich.

Dr. M. M. Afanasiev, Montana State College, Bozeman, Montana.

E. O. Sanford, Director, Dawes Arboretum, Newark, Ohio.

Robert Ross, British Museum, London, England.

Dr. Frans A. Stafleu, International Association of Plant Taxonomists, Utrecht, The Netherlands.

Miss Harriette Halloway, Plainfield, N. J.

Dr. Lakh Batra, University of Kansas.

Dr. J. J. Copeland, City College of New York, New York, N. Y.

Dr. Francis Drouet, Philadelphia Academy of Natural Sciences, Philadelphia.

Dr. B. Pourrelly, Museum of Natural History, Paris.

Dr. R. E. Cameron, California Institute of Technology.

Dr. T. O. Williams, Chicago Natural History Museum, Chicago, Ill.

Dr. W. A. Jensen, University of California, Berkeley, Cal.

Dr. H. Sleumer, Rijksherbarium, Leiden, The Netherlands.

Dr. R. T. Clausen, Cornell University, Ithaca.

Frederic Steele, St. Mary's in the Mountains, Littleton, N. H.

Dr. Aaron J. Sharp, University of Tennessee, Knoxville, Tenn.

Dr. Henry J. Thompson, University of California, Los Angeles, Calif.

Dr. Edgar T. Wherry, University of Pennsylvania, Philadelphia, Pa.

Dr. W. H. A. Hekking, University of Utrecht, Utrecht, The Netherlands.

Dr. and Mrs. Carl Withner, Brooklyn College, Brooklyn, N. Y.

Dr. Rogers McVaugh, Ronald L. Stukey, and A. M. Evan, University of Michigan, Ann Arbor, Mich.

Dr. Ray J. Davis, Idaho State College, Pocatello, Idaho.

Gabriel Edwin, U. S. National Arboretum Herbarium, Washington, D. C.

Dr. Lucille E. Kopp, Huntington, L. I., N. Y.

Dr. and Mrs. Richard H. Wagner, Duke University, Durham, North Carolina.

Mrs. Eliane Norman, Philadelphia Academy of Natural Sciences, Philadelphia.

Dr. Fritz Jonker, University of Utrecht, Utrecht, The Netherlands.

Dr. Arthur Gentile, University of Massachusetts, Amherst, Mass.

Dr. R. F. Raffoff, Smith, Kline and French, Philadelphia.

Dr. C. W. Holmes, F.A.O., Belém, Brazil.

Mrs. Mary Louise Wilkins, Librarian, Dumbarton Oaks, Washington, D. C.

Morgan J. Cramer, President, and Howard E. Gerken of P. Lorillard Company, New York, N. Y. visited the Garden and had lunch with Robert F. Kolkebeck, Assistant Director (Administration), and Henry de la Montagne, Assistant Director Emeritus, at the Lorillard Snuff Mill.

Margaret Herbst of New York City has given six seedlings of laeliocattleya 'Margaret Herbst', named in her honor last year by Horticulture Flandria of Bruges, Belgium, to The New York Botanical Garden. When the seedlings flower, they will be on display at the Garden.

Paul F. Frese of White Plains, New York, has been appointed representative in the North Atlantic States by Sweeney, Krist, and Dimm, horticultural lithographers and publishers of Portland, Oregon. Mr. Frese is widely known throughout the horticultural field as a writer and lecturer, and as former editor of *Flower Grower* and *Popular Gardening*. Sweeney, Krist, and Dimm are currently celebrating their fiftieth anniversary.

Dedication at Planting Fields. The recently completed arboretum at the Planting Fields campus of State University's Agricultural and Technical Institute at Farmingdale, Long Island, was dedicated on May 24, 1962. The new aboretum, which covers one hundred and thirty-eight acres, has been under construction since 1957, financed by the Coe Foundation at a cost of more than $250,000.

Dr. George M. Lawrence, Director of the Rachel McMasters Miller Hunt Botanical Library at Carnegie Institute of Technology, Pittsburgh, was the guest speaker. Everett Miller, a graduate of Farmingdale in ornamental horticulture, class of 1939, spoke on behalf of the alumni. Mr. Miller is Horticulturist at Longwood Gardens.

The opening of the arboretum coincided with the observance of the fiftieth anniversary of the college. The Coe Estate — four hundred and nine acres of horticultural plantings and greenhouses—was willed to Farmingdale, a unit of State University, on May 24, 1949, for use as an adjunct to its educational program in ornamental horticulture. The mansion on the estate is temporarily occupied by the State University Long Island Center, until the Center is established at its permanent campus in Stony Brook, Long Island.

The arboretum was developed under the supervision of Prof. Joseph Roesch, Chairman of the Department of Ornamental Horticulture. Gordon Jones, who has been in charge of the project since its inception, was recently appointed Director of the arboretum.

The American Rhododendron Society awarded its gold medal to Dr. John C. Wister, Director of the Arthur Hoyt Scott Horticultural Foundation at Swarthmore College and of the Henry Tyler Arboretum at Lima, Pennsylvania, for his outstanding contribution to American horticulture and in particular for his interest in rhododendrons. The presentation was made by Dr. J. Harold Clarke, the Society's President, at the annual meeting held at Winterthur, Delaware, immediately following the dinner tendered the three hundred and thirty-six registrants by Mr. and Mrs. Henry F. du Pont.

Henry Fleming received the charter for the Tappan Zee Chapter from Dr. Clarke. Mr. Fleming, who is a Research Associate at The New York Botanical Garden, is President of this new chapter.

The next evening at the Society's annual banquet, which took place in the ballroom adjacent to the conservatory at Longwood Gardens, Dr. Wister received the George C. White Medal. The presentation was made by Dr. Russell Seibert, Director of Longwood Gardens, on behalf of the Massachusetts Horticultural Society. This medal, considered the highest horticultural award in America, is presented by the Board of Trustees of the Massachusetts Horticultural Society to the man or woman, or commercial firm or institution, who has done the most in the trustees' opinion to advance horticulture in its broadest sense. The first recipient of

(Continued on page 155)

Members of the Advisory Council were interested in the irrigation system and the new fence that encloses the children's garden plots. These were presented by the Council to the Children's Gardencraft Program.

1962 SPRING GARDEN TOUR

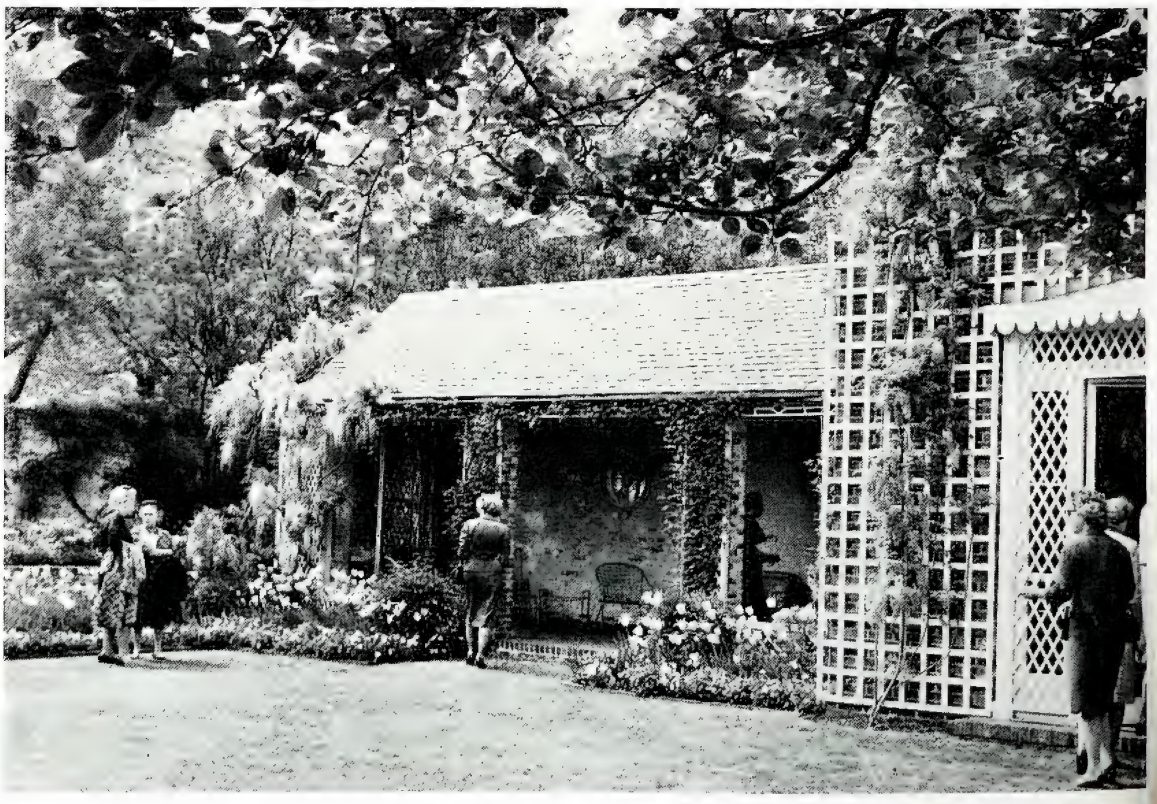
TO GREENWICH, CONNECTICUT

sponsored by The Volunteer Associates of
The New York Botanical Garden

Photographs by Walter Singer
Legends by Howard W. Swift

This welcome sign marks the entrance to the rhododendron lane in the Fairchild Wild Flower Preserve, now a part of the Greenwich Audubon Center.

Horticultural consultants answer innumerable questions, adding greatly to the value of the tour.



This intimate garden with colorful flower borders can be enjoyed from the roofed terrace that extends from the living room of the Georgian-style mansion of Mr. and Mrs. J. Sterling Rockefeller. The upper level of the garden has been planted with shrubs to reduce maintenance. Pears are espaliered against the retaining wall at the back.

The home of Mr. and Mrs. Joseph V. Reed, at Denbigh Farm, is surrounded by a very fine lawn shaded by black locusts. The original New England salt-box dwelling, circa 1820, was moved to its present location in 1920 and since then has been greatly altered and enlarged. Tubs of marguerites are a unique terrace decoration.

Lower left. The slender pillars of a covered terrace at one end of the house frames a broad view of the surrounding countryside.

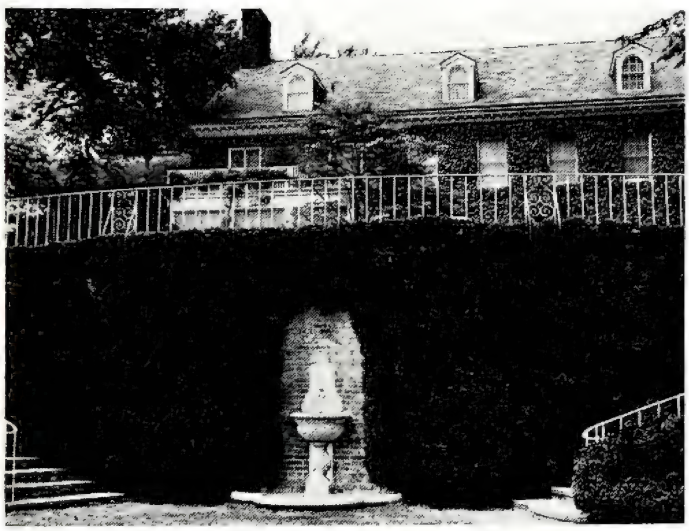
Inconspicuous iron supports give this arbor of wisterias at Denbigh Farm an unusual effect of lightness.

The sunken walled garden outside the library of Mrs. Truesdale's home was originally designed by Mrs. Ellen Shipman for perennial borders. It is now largely planted with spring bulbs, rhododendrons, and boxwoods. Chrysanthemums furnish fall color.

Planted with hollies, leucothoe, and with pachysandra as groundcover, the garden area in front of Mrs. Melville D. Truesdale's house is refreshing and inviting.

The residence of Mr. and Mrs. E. J. Beinecke commands an extensive view down a broad allee, bordered with flowering dogwood and mountain-laurel.

Lower left. Two pieces of one original yew plant have been trained to cover this high retaining wall in a most spectacular manner.



Notable at Sherryvore were mature pear trees, espaliered on heavy wire, at the end of Mr. and Mrs. Beinecke's vegetable garden.

The masses of color furnished by thousands of rhododendrons on the slopes of wooded hills and in sunny valleys at Sherryvore brought forth exclamations of wonder and delight. Earlier in the spring, these acres were filled with many varieties of narcissi.

Visitors pause, as they leave the home of Mr. and Mrs. William B. Weaver Jr., to admire the salmon-pink geraniums on the terrace and the pear trees espaliered against the wall.

Mrs. Weaver bids farewell to a guest beside the sunken garden that features tree and herbaceous peonies, irises, and other colorful perennials.

NEWS (Continued from page 151)

this medal, which was designed in 1909, was to the late Prof. Charles Sargent, then Director of the Arnold Arboretum.

At the seventeenth annual American Horticultural Congress, held in Norfolk, Virginia, Dr. Henry T. Skinner, Director of the United States National Arboretum, Washington, D. C., was elected President of the American Horticultural Society; Dr. Raymond Allen, Director of Kingwood, Mansfield, Ohio, First Vice President; and Dr. Frits Went, Director of the Missouri Botanical Garden, Second Vice President. Mrs. Grace Wilson was re-elected Acting Secretary-Treasurer.

Dr. Hugh A. Cutler, Acting Director of the Missouri Botanical Garden, was appointed Chairman of the Committee on Arrangements for the eighteenth American Horticultural Congress which will be held in St. Louis in October, 1963.

The Liberty Hyde Bailey Medal was awarded to Henri Teuscher, Curator of the Montreal Botanical Garden, for his design of a modern educational and scientific botanic garden. Citations were presented to William Gotelli of South Orange, N. J., for his collection of dwarf conifers; to Dr. L. F. Randolph of Cornell University for his work on the genetics of iris and other plants; to Frank Reinelt of Capitola, Cal., for his development of delphiniums, tuberous begonias, and primroses; to Dr. Orland E. White of Charlottesville, Va., for his work in adapting exotic plants to American gardening and especially for his inspired teaching of horticulture; to Mulford B. Foster for his contributions to the knowledge of bromeliads; and to Sam Caldwell of Nashville, Tenn., for his writings on gardening.

Members of the Herb Society of America had the pleasure of visiting Dumbarton Oaks, in Washington, D. C., during the 1962 annual meeting. It is, indeed, as Lanning Roper described it in *The Journal* of *The Royal Horticultural Society,* "a great American garden." The property, acquired in 1922 by the late Hon. Robert Woods Bliss and Mrs. Bliss, was developed to its refined and elegant state through the collaboration of Mrs. Bliss and the late Mrs. Beatrix Farrand, one of America's notable landscape architects.

Dumbarton Oaks with its rare collection of books and objects of art was conveyed to Harvard University in 1940, "that the continuity of scholarship in the Byzantine and Mediaeval humanities may remain unbroken to clarify an ever changing present and to inform the future with wisdom." In 1941, Dumbarton Oaks became the property of the Trustees for Harvard University, who are responsible for its development as a research center.

At the same time, an endowment fund was established to preserve and develop the gardens. The members of the Herb Society observed with great interest the series of gardens and especially the large Byzantine garden that is presently being created, each pebble (imported from Lower California and Mexico) being meticulously selected and set in place by the hands of a seventy-three-year-old Italian artisan.

The Founder's Room in the Library contains old and rare herbals, prints, memorabilia, and books on the history of gardens and on garden design which were collected by Mrs. Bliss. The Librarian, Mrs. Mary Louise Wilkins, arranged a display of these fascinating items for the benefit of the Herb Society.

The full four-day schedule included a visit to the Cathedral of St. Peter and St. Paul and its very beautiful Bishop's Garden. In this twelfth-century mediaeval garden are two cedars of Lebanon which were brought from the Holy Land and planted by the late Dean Bratenahl, boxwood over two hundred years old, lavendar, rosemary, and other old-time herbs, ancient bas-reliefs, and a path built of stone cut by slaves many, many years ago. A capital of the thirteenth century from the ruins of a monastery near Rheims Cathedral is now used as part of a sundial. A brief service was conducted by Bishop Creighton of the Washington Diocese before Mrs. Wanda M. Ritchie, the Society's President, planted a medlar tree to honor Florence Bratenahl, the founder and designer of the Bishop's Garden and a co-founder of the Herb Society of America.

Mt. Vernon with its broad sweeping lawns, its magnificent trees, its great variety of shrubs, is a joy to all gardeners; but to herb gardeners the kitchen garden had a particular appeal. There many lavender plants were flowering freely, lettuce heads were perfectly formed, onions were growing vigorously, fruits were espaliered against the brick wall and trained on cordons to enclose the beds of vegetables and herbs. Robert Fisher, who was graduated from the School for Gardeners at The New York Botanical Garden, is the Horticulturist of Mt. Vernon.

Woodlawn Plantation, whose gardens have been restored through the efforts of the Garden Club of Virginia, with the cooperation of the late Alden Hopkins, was also visited. George Washington gave two thousand acres as a wedding gift to Eleanor Park Custis, Martha Washington's daughter, and Lawrence Lewis, his nephew; five years later, after their mansion had been built, the Lewises took up residence on this plantation. The panoramic view from the front terrace toward the Potomac is to this day breath-taking. Old, towering tulip-poplars, aged hemlock, boxwood probably "slipped" from the boxwood at Mt. Vernon, crape-myrtle (*Lagerstroemia indica*), with its satiny fawn-colored bark, photinia, fothergilla, vitex, and sweet-shrub or Carolina allspice (*Calycanthus floridus*) attracted attention. The parterres of old roses were a delight to behold. Meredith Johnson, Director of Woodlawn Plantation, has gathered together an interesting collection of them—Scotch or Burnet (*Rosa spinosissima*), Austrian Copper (*R. foetida bicolor*), Harison's Yellow (a hybrid between *R. foetida* and *R. spinosissima*), Sweetbrier (*R. eglanteria*), Maiden's Blush (*R. alba*), Duchesse de Bratant, Cardinale de Richelieu, Empress Josephine, and others.

The gardens in Georgetown and Alexandria, which were opened to the members of the Herb Society of America, were enchanting. Personal and intimate, they reflect the discriminating tastes and varied interests of their owners. The

greetings from the Old Town Walled Garden Club of Alexandria were happily expressed: "As a relatively new organization in this ancient city, we welcome you, our first-out-of-town visitors. All who open gates to you this morning do their own seeding and weeding, and, like other dirt grubbers showing off borders, we 'wish you could have seen them last week.' We regret that not one of the places we show you features herbs. As matter of horticultural fact, herbs are not easily grown in city walled gardens—too little sun, too much acidity."

Certain plants with which northern and midwestern gardeners infrequently come into contact, elicited the usual questions, "What is this? What is that?" Among these were several fine specimens of *Viburnum rhytidophyllum* in the garden of Mrs. R. Sherrard Elliott, Jr., coauthor with Louis H. Frohman of *A Pictorial Guide to American Gardens*; *Mahonia bealei*, very heavily fruited, its bloom-covered blue berries looking like bunches of grapes; *Skimmia japonica*; *Sarcococca hookeriana*; several hollies including *Ilex pernyi, I. burfordii, I. integra;* the fragrant, white-flowered *Osmanthus ilicifolius*; China-fir (*Cunninghamia lanceolata*); and *Paulownia tomentosa*. It is surprising how many are unfamiliar with this tree from China, which escaped from gardens and naturalized itself from Georgia to southern New York. Its showy panicles of fragrant, tubular, violet flowers caused comment among members of the American Rhododendron Society during their recent visit to Winterthur and Longwood Gardens, as also among members of the Herb Society as they toured the Washington, D. C. area.

Those who are interested in boxwood could take note of the many varieties that are being developed, from the exhibit set up by Mrs. James M. Strayer with the assistance of Llewelyn Williams, Senior Botanist in the Crops Research Division of the United States Department of Agriculture. The small plants were furnished by Dr. Walter S. Flory, Curator of the Orland E. White Research Arboretum at Boyce, Virginia. The display of box was one of the many fascinating exhibits arranged by the several units and the members-at-large of the Herb Society of America.

International Horticultural Exhibition at Hamburg. Hamburg has a tradition, almost one hundred years old, in international horticultural exhibition. The first one took place in 1869, when four hundred and twenty exhibitors from Europe and North and South America participated. Subsequent ones were held in 1897, 1914, 1936, and 1953. The last, the first international horticultural exhibition after World War II, attracted an attendance of five million people from more than thirty nations.

The 1963 International Exhibition will open on April 26 and close on October 13. Exhibits are anticipated from over twenty countries. There will be gardens as well as indoor and outdoor shows of ornamentals, fruits, and vegetables.

The National Botanic Gardens of South Africa, whose headquarters are at Kirstenbosch, is an institution well-known throughout the botanical world. Kirstenbosch is unique in that only plants indigenous to southern Africa are cultivated and the Gardens are, therefore, of considerable interest to botanists on an international scale.

Kirstenbosch will celebrate its Golden Jubilee in 1963. It is proposed to hold commemorative functions throughout the year, but the highlight of the events will be a botanical tour of about three weeks, preceded by a week of lectures, discussions, and symposia on botanical and allied subjects to be held at Kirstenbosch.

The principal events are expected to begin on September 22, 1963; the botanical tour, which will take visitors through areas typical of the main vegetation of South Africa, will end on October 21, 1963.

Honorary Degree to Dr. Steere. Dr. Steere is the recipient of the honorary degree of Doctor of Science from the University of Michigan. The presentation was made by President Harlan Hatcher on June 16, 1962.

Dr. Steere received his B.S. and A.M. degrees and his doctorate from the University, and served on its faculty as an instructor from 1931-1936, as professor of botany from 1946 and as Chairman of the Department of Botany from 1947-1950, at which time he was appointed to the faculty of Stanford University. He was professor of biology at Stanford and in 1955 became Dean of its Graduate Division. In 1958 he was appointed the Garden's Director.

The citation reads: "William Campbell Steere, B.S. 1929, A.M. 1931, Ph.D. 1932; Director of The New York Botanical Garden. Grandson of Michigan's pioneer naturalist Joseph Beal Steere, student, professor, department chairman, and curator in the herbarium of the University of Michigan, William Steere is bound to this institution by so many ties that we might now be suspected of undue familiar tenderness if his attainments were not also such as the world may see. Distinguished for his bryological research in the laboratory and in the field, respected for the versatility of his talents and interests as well as for his authoritative specialized knowledge, and held in affection for his generosity to his peers and younger fellows, Professor Steere is now appropriately serving as director of one of the principal centers for botanical study in the nation and the world. It gives us profound pleasure to confer upon him the degree Doctor of Science."

Seth L. Kelsey of Boxford, Massachusetts, has been appointed a member of the Advisory Council of the United States National Arboretum by Secretary of Agriculture Orville L. Freeman. His father, the late Harlan P. Kelsey, served on the Advisory Council for a number of years. Mr. Kelsey is President of the Kelsey-Highlands Nursery, President of the Horticultural Club of Boston, and a trustee of the Massachusetts Horticultural Society.

BRIEF NOTES ON BOOKS (From page 148)

This publication, sponsored by The United States Golf Association, is written for those concerned with the care of grass areas including golf courses, public parks, and extensive home lawns. Especially useful are the descriptions of common turf weeds with recommended specific herbicides, the glossary of fertilizer, liming and soil-amendment materials, and the identification key (by vegetative characters) of special-purpose turf grasses.

WEEDS AND ALIENS. Salisbury, Edward. 384 pages, illustrated (colored front.), bibliography, indexed. (The New Naturalist Series). The Macmillan Co., New York. 1961. $6.00.

The author, who is a former Director of Kew, defines a weed as "a plant growing where we do not want it." He then proceeds to describe these cosmopolitan plants in careful detail and to discuss their stupendous economic importance. A most informative, attractive, and readable contribution.

REGIONAL BOOKS

CALIFORNIA DESERT WILDFLOWERS. Munz, Philip A. 122 pages, illustrated (part colored), indexed. University of California Press, Berkeley. 1962. Paper, $2.95; cloth, $4.75.

The second of a series on California flora written by Dr. Munz for the layman. 172 line drawings, 2 maps, 96 color photographs, with "just enough text to give names and a few pertinent facts describing the plants and their location." A "must" for the traveler in California.

ENGLISH FARMING, PAST AND PRESENT, 6th ed. Ernle, Rowland E. Prothero, Baron. 559 pages, bibliography, indexed. Quadrangle Books, Chicago. 1961. $10.00.

This English agricultural classic was written fifty years ago, by Lord Ernle, then R. E. Prothero. The present new edition is a reprinting of the fifth edition (edited by Sir Daniel Hall and long-out-of-print) with two additional chapters by G. E. Fussell and O. R. McGregor.

FLOWERING TREES OF THE WORLD FOR TROPICS AND WARM CLIMATES. Menninger, Edwin A. 336 pages, illustrated (part colored), bibliography, indexed. Hearthside Press, New York. 1962. $18.95.

One of the outstanding botanical-horticultural reference books of the year, with a copious text and over four hundred illustrations in color. Written by an authority who has known and grown much of the plant material he discusses. Useful to gardeners and botanists, particularly in Florida and southern California, and to residents and travelers in the tropics and subtropics.

JAPANESE BOTANY DURING THE PERIOD OF WOOD-BLOCK PRINTING. Bartlett, Harley H., and Hide Shohara. 271 pages, illustrated, bibliography, indexed. Dawson's Book Shop, Los Angeles. 1961. $7.50.

The Center for Japanese Studies at the University of Michigan has one of the best Japanese libraries in America. From this collection books and manuscripts, mostly horticultural and botanical, were selected for an exhibition which was held at The Clements Library of the University in 1954. This volume is divided into two parts. The first part contains an extensive and comprehensive discussion of Japanese botanical and horticultural literature and illustration during the period before the time of the restoration in 1868. The second part is a splendidly annotated and illustrated catalog of

the exhibit. A most valuable bibliographical reference work.

MEXICAN FLOWERING TREES AND PLANTS. O'Gorman, Helen. 218 pages, colored illustrations, bibliography, indexed. Ammex Associados, Mexico City, 1961. $15.00.

Helen O'Gorman, talented painter of Mexico's flora, has produced a superb work, outstanding in format, reproductions, and not-too-technical text. Over one hundred Mexican plants (for the most part, indigenous) are illustrated in full-color plates. A wealth of information, including vernacular names and herbal and other uses.

ORNAMENTAL SHRUBS OF CALIFORNIA. Enari, Leonid. 214 pages, illustrated, indexed. Ward Ritchie Press, Los Angeles. 1962. $5.95.

So many regional flora books deal exclusively with native plants. In this manual Dr. Enari of the Los Angeles State and County Arboretum has also included numerous introduced ornamental shrubs which are to be found in gardens, parks, and nurseries in California. The intelligent amateur will find the keys and descriptions comparatively easy to use.

REPORT OF THE TROPICAL PRODUCTS INSTITUTE, 1960. 16 pages. (Great Britain. Department of Science and Industrial Research) British Information Services, New York. 1961. Paper, 60 cents.

Here is reviewed in considerable detail numerous inquiries received and investigations and surveys made by The Tropical Products Institute (Charles House, London). The scope includes foodstuffs, fruits, vegetables, oils and fats, spices, gums, resins, tanning materials, vegetable fibers, and paper making.

A SURVEY OF VEGETATION IN THE NAVAJO RESERVOIR BASIN. Woodbury, A. M., Stephen D. Durrant and Seville Flowers. 99 pages, illustrated, indexed. (Anthropological Papers No. 51) University of Utah Press, Salt Lake City. 1961. Paper, $1.60.

Deals with a part of the Upper Colorado River Basin project sponsored by the United States Bureau of Reclamation and the University of Utah, in particular with the vegetation along the San Juan River in Colorado and New Mexico. Extensive statistical tabulated data.

ECONOMIC CROPS

AROMATIC OR ORIENTAL TOBACCOS. Walf, Frederick A. 278 pages, illustrated, bibliography, indexed. Duke University Press, Durham, N. C. 1962. $12.50.

Dr. Wolf, Professor Emeritus of Botany at Duke University and one of the world's authorities on tobacco culture and production, presents in this volume a technical survey based on over twenty years of research with this special group of tobaccos. It is the first comprehensive work to be written in English with the contents covering the history, botany, genetics, chemistry, classification, cultivation, curing, and economic aspects of production. A scholarly work.

CROP ADAPTATION AND DISTRIBUTION. Wilsie, Carroll P. 448 pages, illustrated, bibliographies, indexed. W. H. Freeman and Co., San Francisco. 1962. $9.00.

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Although written primarily for college students of agronomy, the broad regional and subject coverage of this textbook makes it useful to workers in forestry and economic botany. Dr. Wilsie has for many years taught a course in crop adaptation at Iowa State University.

GRASS AND PEOPLE. Wilson, Charles Morrow. 233 pages, illustrated, bibliography, indexed. University of Florida Press, Gainesville. 1961. $6.50.

A popular author with a facile pen tells the fascinating history of one of our most important plant families and brings the reader up-to-date on the latest results from world-wide experiments. Contains much valuable data, including a chapter on "Companion Legumes."

THE ORANGE: ITS BIOCHEMISTRY AND PHYSIOLOGY. Sinclair, Walton B., ed. 475 pages, illustrated, bibliography, indexed. University of California, Division of Agricultural Studies, Berkeley. 1961. $6.50.

Almost twenty years have elapsed since Weber and Batchelor's *The Citrus Industry* was published. This present volume supplements, in part, that great work by presenting a review of recent biochemical and physical research on the orange. The authors of the twelve chapters are all eminent investigators in their respective fields.

FORESTRY AND LUMBER

THE SMALL PRIVATE FOREST IN THE UNITED STATES. Stoddard, Charles H. 171 pages. Resources for the Future, Washington, D. C. 1961. Paper, $2.00.

The problem of the unproductive small private forest has significant economic importance. Here is reviewed a study of present and past programs with recommendations for improved forestry on small holdings. Useful information in the Appendix includes a summary of forest taxations laws by states.

TREATING AND DRYING TREES ON THE STUMP. Zakharov, P. S. 31 pages, illustrated, bibliography. Consultants Bureau, New York. 1961. Paper, $12.50.

A translation of the third edition of a work published in 1959 by the State Wood and Pulp Industry Press in Leningrad. The author describes a method of drying trees "on the stump" by which wood loses about fifty per cent of its weight, does not warp, has no cracks, and requires a shorter period than wood dried in piles.

BOTANY

DESIGNS IN NATURE. Borsig, Tet. 15 pages, 80 photographs. (A Studio Book) The Viking Press, New York. 1961. $6.95.

Superb plant photographs—macroshots—produced by means of a magnifying glass. They remind one of Blossfeldt's *Urformen der Kunst*.

DEVELOPMENT AND STRUCTURE OF PLANTS: A PHOTOGRAPHIC STUDY. Lee, Addison E., and Charles Heimsch. 64 pages, illustrated, indexed. Holt, Rinehart and Winston, New York. 1962. Paper, $1.50.

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Over one hundred photographs illustrate plant morphology and anatomy with explanatory text. Many of the pictures are made from microscopical material. A useful visual aid for the elementary botany student.

HANDBOOK OF FIELD BOTANY. Clarkson, Quentin D. 76 pages, illustrated, bibliography, indexed. Binfords and Mort, Portland, Oregon. 1961. $2.00.

A pocket-size primer for the botanical beginner who wishes to learn the simple A B C of plant morphology. Although the text can be used to advantage in any section of the country, the suggested regional readings are confined to the Pacific Northwest.

WILDFLOWERS. House, Homer D. 362 pages, illustrated (part colored), indexed. The Macmillan Co., New York. 1961. $17.95.

Many of us remember back in 1918 when a beautiful two-volume set was issued by the State of New York, entitled *Wildflowers of New York*. This was reprinted and published in one volume in 1934 by the present publisher. Both editions have been out-of-print much too long. The work has now been reissued from new plates and contains 364 full-color illustrations with the same descriptive non-technical text.

PLANT PHYSIOLOGY

GIBBERELLINS. American Chemical Society. Div. of Agricultural and Food Chemistry. 167 pages, illustrated, bibliographies. (Advances in Chemistry series No. 28) Amer. Chemical Society, Washington, D. C. 1961. Paper, $6.00.

Papers presented at the Symposium on Gibberellins at the 138th national meeting of The American Chemical Society, held in New York in September 1960. The purpose of this symposium was to present the latest knowledge of this spceial field of growth regulation with the hope that it would promote coherent and coordinated research.

ON GROWTH AND FORM; abridged ed. Thompson, D'Arcy Wentworth. 346 pages, illustrated, indexed. Cambridge University Press, New York. 1961. $5.95.

First published in 1917, with a second edition in 1942, this standard classic has now been revised and shortened by Dr. John Tyler Bonner.

PIEZOELECTRIC PROPERTIES OF WOOD. Bazhenov, V. A. 180 pages, illustrated, bibliography, indexed. Consultants Bureau, New York. 1961. $9.50.

The original Russian text was published by the Academy of Sciences of the USSR in 1959. The translator states that this is the first authoritative full-length work on the subject.

CLIMATOLOGY

THE CLIMATES OF THE CONTINENTS, 5th ed. Kendrew, W. G. 608 pages, illustrated, bibliography, indexed. Oxford University Press, New York. 1961. $8.80.

Recent findings have been incorporated in this edition of an important reference work for biologists, botanists, and world travelers in general.

GENERAL BIOLOGY AND MICROBIOLOGY

ACHIEVEMENTS IN SOVIET MICROBIOLOGY. Imshenetskii, A. A., ed. 75 pages, bibliography. Consultants Bureau, New York. 1961. Paper, $12.50.

The original Russian text of this historical survey was published for the Institute of Microbiology of the Academy of Sciences of the USSR in 1959. Contents include: "Progress in General Microbiology" by A. A. Imshenetskii; "Achievements of Soviet Microbiology in the Field of the Study of the Geological Activity of Microorganisms" by S. I. Kuznetsov; "Forty Years of Technical Microbiology in the USSR" by V. N. Shaposhnikov, N. D. Ierusalimskii and I. L. Rabotnoya; "Achievements in the Field of Soil Microbiology in the USSR" by E. N. Mishustin.

GENERAL BIOLOGY, 4th ed. Core, Earl L., Perry D. Strausbaugh and Bernal R. Weimer. 555 pages, illustrated, indexed. John Wiley and Sons, New York. 1961. $7.95.

New material and illustrations have been added to make this edition of a standard work, first published in 1938, reflect the findings of recent biological research.

SOME ASPECTS OF LIFE IN FRESH WATER, 2nd ed. Popham, Edward J. 127 pages, illustrated, bibliography, indexed. Harvard University Press, Cambridge, Mass. 1961. $2.25.

A good textbook for British students written by a lecturer in zoology at the University of Manchester. The general explanations and discussions are excellent, but because the examples are taken from the British flora and fauna this book has its limitations for students in America.

SURVEY OF BIOLOGICAL PROGRESS, Vol. IV. Glass, Bentley, ed. 465 pages, bibliographies, indexed. Academic Press, New York. 1962. $10.00.

Contributions on animal taxomony by R. E. Blackwelder; on ribonucleic acid by H. Fraenkel-Conrat; on pituitary hormones by Choh Hao Li; on home range of mammal communities by L. E. Brown; on biochemistry of energy transformations during photosynthesis by André T. Jagendorf; and on antibiotics by Vernon Bryson.

NATURAL HISTORY

BEYOND YOUR DOORSTEP: A HANDBOOK TO THE COUNTRY. Borland, Hal. 401 pages, illustrated, bibliography. Alfred A. Knopf, New York. 1962. $5.95.

Many of the delightfully nostalgic nature editorials, which have appeared in *The New York Times* have come from Mr. Borland's pen. In the present volume the reader hikes with the author from his doorstep in Salisbury, Connecticut, down cart paths, through bogs, woodlands, and pastures. This fascinating account abounds with the wisdom of a dedicated, self-made naturalist. At the back of the book are check lists of plants and animals which have been observed.

THE CONTINENT WE LIVE ON. Sanderson, Ivan T. 299 pages, illustrated (part colored),

indexed. (A Chanticleer Press Edition) Random House, New York. 1961. $20.00.

A grandiose natural history survey of the North American continent — plants, animals, mountains, rivers, forests, seashore life, deserts, mnierals, birds, insects, fish, snakes, and so forth. Over three hundred illustrations by eminent photographers Ansel Adams, Rutherford Platt, Charles Ott, Roger Tory Peterson, Alan Cruickshank, and Gottscho-Schleisner, to name only a few. A thrilling picture book for those who cannot read and for those who can there are offered many, many hours of intriguing "armchair exploration."

THE FOREST. Farb, Peter, and the Editors of Life. 192 pages, illustrated (part colored), bibliography, indexed. (Life Nature Library) Time, Inc., New York. 1961. $3.95.

The multitudinous facets of plant and animal life in the forests of the world are dramatically described and illustrated by fine photographs and line drawings. Identification keys to trees, statistical figures of interest to conservationists, list of our "biggest" trees, uses of lumber and other forest products—all these and much more have made this a wonderful book to be enjoyed by all ages.

THE NATURAL HISTORY OF THE LEWIS AND CLARK EXPEDITION. Burroughs, Raymond D., ed. 340 pages, bibliographies, indexed. Michigan State University Press, East Lansing. 1961. $7.50.

Numerous commentators have written about the famous Lewis and Clark expedition, but Mr. Burroughs is the first to write at length exclusively on its important contributions to American wildlife history of the early nineteenth century. Wherever possible, he has presented the observations of the explorers in their own words.

THE TWELVE SEASONS: A PERPETUAL CALENDAR FOR THE COUNTRY. Krutch, Joseph Wood. 188 pages, illustrated. (Apollo Editions) William Sloan Associates, New York. 1961. Paper, $1.50.

A charming collection of nature essays—one for each month—now in a paperback edition.

CONSERVATION

AMERICAN WILDLIFE AND PLANTS. Martin, Alexander C., Herbert S. Zim, and Arnold L. Nelson. 500 pages, illustrated, bibliography, indexed. Dover Publications, New York. 1961. Paper, $2.25.

An invaluable source book on food plants of our American birds and mammals, now available in an inexpensive paperback.

CRUSADE FOR WILDLIFE: HIGHLIGHTS IN CONSERVATION PROGRESS. Trefethen, James B. 377 pages, illustrated (colored front.), bibliography, indexed. (A Boone and Crockett Club Book) The Stackpole Co., Harrisburg, Pa. 1961. $7.50.

The great conservation movement in this country is less than a hundred years old, yet within the past century dynamic figures have left their names in its annals of progress—Theodore Roosevelt, Gifford Pinchot, George Bird Grinnell, Charles Sheldon, William T. Hornaday, Stephen Mather, and Aldo Leopold. This rich, dramatic history is based on much unpublished source material.

NATIONAL PLANT CONSERVATION GUIDE. Burns, Ethel M., comp. Unpaged, illustrated. National Council Books, Philadelphia. 1961. Paper, $3.00.

A most welcome compilation of the official flower, tree, and bird, and the plant preservation list (wherever this exists) for each of the fifty states and the District of Columbia.

OUR WILDLIFE LEGACY, rev. ed. Allen, Durward L. 422 pages, illustrated, bibliography, indexed. Funk and Wagnalls Co., New York. 1962. $6.50.

Dr. Allen has been active in conservation for over a quarter of a century and is at present Professor of Wildlife Management at Purdue University. He writes well concerning the present status and future trends of our national plant and animal resources.

WILDERNESS: AMERICA'S LIVING HERITAGE. Brower, David, ed. 205 pages, illustrated. Sierra Club, San Francisco. 1961. $5.75.

Papers and resumés of discussions of the Seventh Wilderness Conference, sponsored by the Sierra Club in the spring of 1961. Stimulating text with magnificent photographs.

BIOGRAPHY, HISTORY, AND TRAVEL

CRÉVECOEUR'S EIGHTEENTH-CENTURY TRAVELS IN PENNSYLVANIA AND NEW YORK. Crévecoeur, Michel Guillaume. 172 pages, illustrated, indexed. University of Kentucky Press, Lexington. 1961. $5.00.

The first published English translation of a neglected important "Americana"—*Le Voyage dans la Haute Pensylvanie et dans l'Etat de New York* (1801). Percy G. Adams, who is a member of the staff of the University of Tennessee, has written a fascinating introduction and has also translated and edited these selections.

DARWINISM AND THE STUDY OF SOCIETY: A CENTENARY SYMPOSIUM. Banton, Michael, ed. 191 pages, indexed. Quadrangle Books, Chicago. 1961. $5.00.

Eleven provocative essays based upon papers presented at the Edinburgh Conference in April, 1959, with an introduction by Dr. J. Bronowski.

EAT NOT THIS FLESH; FOOD AVOIDANCES IN THE OLD WORLD. Simoons, Frederick J. 241 pages, illustrated, bibliography, indexed. University of Wisconsin Press, Madison, Wis. 1961. $6.00.

An account, with an extensive bibliography, of the curious food restrictions, superstitions, and taboos among Christians, Jews, Moslems, and numerous other groups, by the author of

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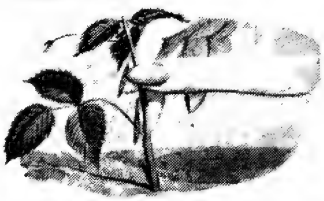

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Northwest Ethiopia: Peoples and Economy. An enlightening approach to the threatening problem of feeding the world's people.

A FLOWER-LOVER'S MISCELLANY. Barraclough, Daphne. 160 pages, illustrated (part colored). Frederick Warne and Co., New York. 1961. $3.95.

Legends, superstitions, folk-lore, herbs, some cultural information make up this attractive gift-book anthology from England.

FOLK AND MODERN MEDICINE. James, Don. 320 pages, bibliography. (A Monarch Human Behavior Book) Monarch Books, Derby, Conn. Paper, 50 cents.

Folklore medicine, whether it be fact or fiction, has a fascination, particularly to those of us who are interested in herbs. In *Folk and Modern Medicine* many ailments are considered, and many so-called cures are described. The case-history technique makes for entertaining reading.

GLOW OF CANDLELIGHT: THE STORY OF PATRICIA MURPHY. Murphy, Patricia. 260 pages, illustrated (part colored), indexed. Prentice-Hall, Englewood Cliffs, N. J. 1961. $3.95.

A sparkling autobiography of a twentieth-century lady "Horatio Alger," who was born in Newfoundland and who has made a name for herself in the world of good foods and exotic plants. Menus and recipes from her three famous restaurants are included.

THE NATURE AND USES OF MODERN FUNGICIDES. Sharvelle, E. G. 308 pages, illustrated, indexed. Burgess Publishing Co., Minneapolis, Minn. 1961. $6.00 (Multilith and wire binding).

An excellent, up-to-date handbook on the nature and uses of modern fungicides designed for use by research workers, county agricultural agents, biology teachers, and professional and amateur gardeners. Chapter 20, "Prescriptions for Plant Disease Control," with details on control of fruit, flower, lawn, shade tree, and vegetable diseases, should be especially helpful. An appendix includes technical information such as conversion factors and formulae for liquid and mist-blower applications of fungicides.

P. P. Pirone

MICHIGAN WILDFLOWERS. Smith, Helen V. 465 pages, illustrated by Ruth Powell Brede, indexed, keys, glossary. Bulletin 42, Cranbrook Institute of Science, Bloomfield Hills, Michigan. 1961. $5.00.

This book reflects successfully the many years of hard work that produced it. Michigan has a wide variety of habitats for plants, ranging from prairies in the southwestern corner to subarctic-montane niches in the high ridges of the Upper Peninsula. The diversity of the environment naturally results in a rich flora and many types of vegetation. Dr. Smith presents 483 species of wild flowers. with accurate but reasonably non-technical descriptions. She also gives us much information of general interest about families and many species, concerning their uses, their general distribution, and many other topics. Some botanists will object to a choice of typography that places undue emphasis on the common names, instead of giving "equal billing" to common and Latin names. Mrs. Brede's excellent plates—231 black and white and seventeen in color—illustrate all the species described and provide an easy means by which to identify Michigan wild flowers, especially for those who lack sufficient confidence in themselves to use the keys. The teamwork of a professional botanist and an experienced artist has produced an unusually useful book.

William C. Steere

FOSSILS: AN INTRODUCTION TO PREHISTORIC LIFE. Matthews, William H. 337 pages, illustrated, indexed. (Everyday Handbook No. 280). Barnes & Noble, Inc., New York. Paper $2.25, Cloth $5.75.

This "Introduction" to prehistoric life embraces the entire field of paleontology, the collecting of fossils, their identification, age, and use. Its discussions range from microfossils and earliest invertebrates to vertebrates and man, including the Piltdown hoax. The material is treated from an evolutionary point of view.

This vast section of "Historical Geology" is so condensed that the book becomes indeed only basic to the beginning amateur, but stimulating to the point where he may branch out into spheres of his own interest.

Appendices on the main divisions of the organic world, a glossary, reference works, sources of geologic information for the fifty States, and an index are a valuable contribution.

Herman F. Becker

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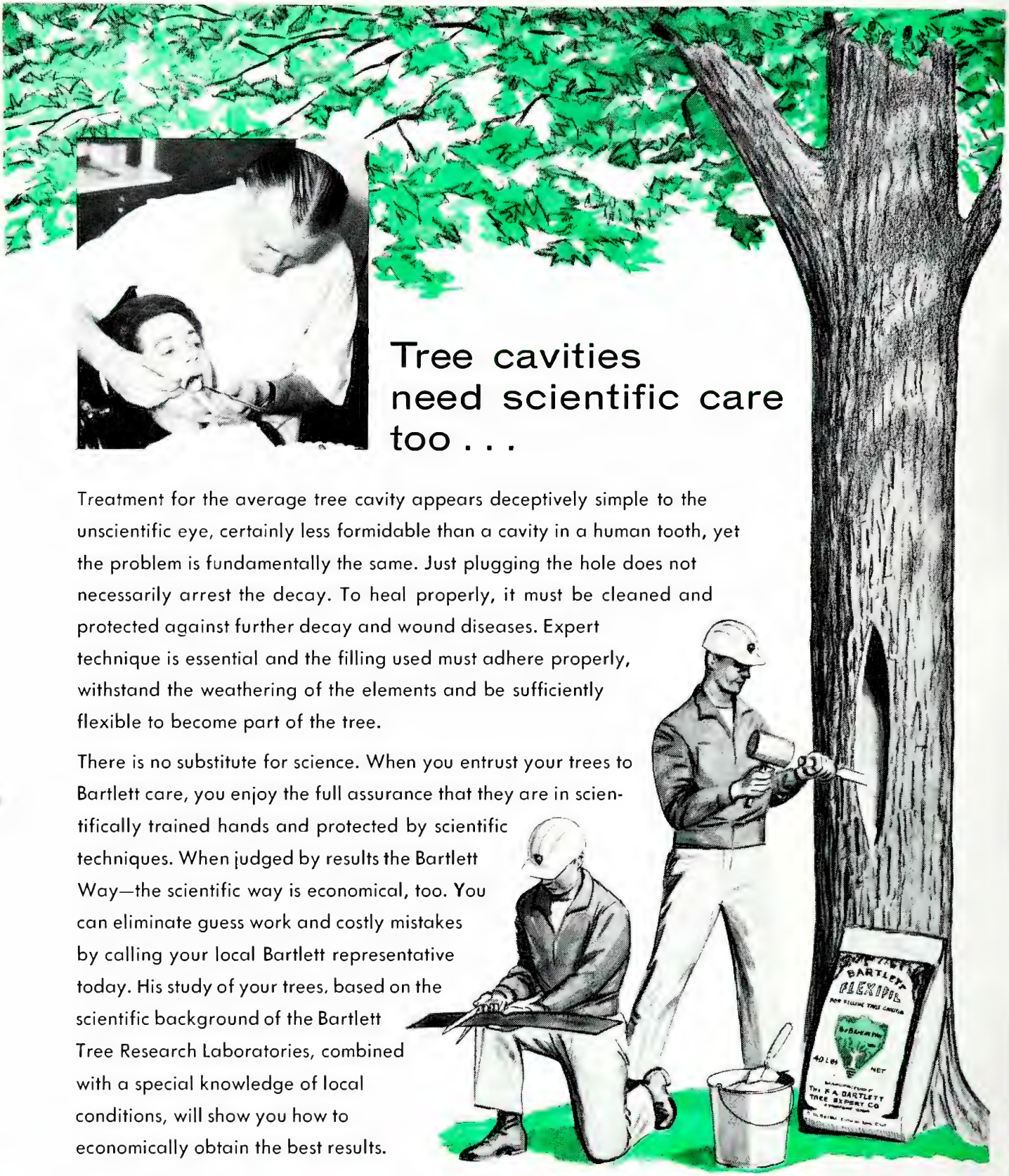

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Editor

CALENDAR

September 29, 1962; 3 p.m. "Japanese Art of Bonsai — Its Creation and Enjoyment" by Yuji Yoshimura, well-known teacher of bonsai and co-author of *The Japanese Art of Miniature Trees*. This is the first program in the fall-winter 1962-63 Free Saturday Afternoon Programs given in the Lecture Hall of the Museum and Administration Building of The New York Botanical Garden.

October 27, 28, 1962. Nineteenth Annual Show of the National Chrysanthemum Society, U.S.A., Inc., and Seventh Annual Show of Potomac Chrysanthemum Society, Shoreham Hotel, Washington, D. C.

December 4, 1962. Theater Benefit—"Lord Pingo," starring Charles Boyer at the Royale Theater—sponsored by the Volunteer Associates of The New York Botanical Garden.

December 6, 1962. Holiday House Tour in New York, N. Y., sponsored by The Volunteer Associates of The New York Botanical Garden.

January 10, 17, 24, and 31, 1963. Downtown Lecture Series, sponsored by The Volunteer Associates of The New York Botanical Garden.

March 19-20, 1963. International Flower Show, City Hall, Cape Town, celebrating the "Golden Jubilee" of the National Botanic Gardens of South Africa, Kirstenbosch.

April 26 - October 13, 1963. International Horticultural Exposition, Hamburg, West Germany.

May 6, 1963. Annual Meeting of The New York Botanical Garden.

June 8, 1963. Twenty-first Annual Rose Day at The New York Botanical Garden.

October 9-12, 1963. Eighteenth annual American Horticultural Congress, Missouri Botanical Garden, St. Louis, Mo. Hotel headquarters: Chase-Park Plaza.

April-October, 1964. "Gardens of the Nations"—International Garden Show, Vienna, Austria. For information, write to Exhibition Secretariat, WIG 64, Wiener Stadthalle—Stadion Betriebsgesellschaft m. b. h., Vienna 15, Vogelweidplatz 14, Austria.

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CREDIT FOR ILLUSTRATIONS

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ARCHITECTURAL ASPECTS OF PLANTS

By DONALD J. MARTEL

Professor Martel is Head of the Department of Landscape Architecture at Oregon State University, Corvallis. The following is adapted from the paper that he presented at the Short Course given at Ohio State University, Columbus, in January, 1962.

THE TITLE SUGGESTS the intention of relating the unfamiliar to the familiar. And it further suggests that plants in this case are regarded without emotion—as if they were not living things endowed with all the small miracles we attribute to nature. But most important of all, this title gives the author the opportunity of discussing a favorite subject—plants.

The most important function of plants in any landscape composition, urban or otherwise, is that of developing livable space. Our immediate concern might seem to be that of making a place more beautiful by adding beautiful plants to it; but this, I am sure, is the wrong approach. If a landscaped situation is comprehensible to the observer—if it makes sense, then the beauty of it will be appreciated and the seasonal variation in leaves, flowers, stems, and so on will be appreciated as variations on the general theme.

Architecture plays an important part in our lives. We are born into architectural spaces. We become accustomed to architectural spaces defined by floors, walls, and ceilings. These spaces are quite well related to the size of man, and are fairly well related to man's activities. The space of a dining-room, of a sales-room in a department store, or the space of a warehouse is usually well related to his size and the activity in which he is engaged. Since we become conditioned to spaces which are more or less standardized, it is not surprising that we are greatly impressed by spaces which are either very small or very large, according to our standards of reference.

The problem of the landscaper is to enclose outdoor spaces. It should be pointed out that some plants are more effective than others used as walls of exterior spaces. The illustration of *Cornus kousa chinensis* indicates why. The structure of this tree is such that there is a continuous wall of foliage from the ground up. Even the flowers are so arranged on the branches as to make it necessary to view them from the side. This plant, then, is best viewed in profile. Thus we might say that any tree that is moderately compact with foliage from the ground up will be satisfactory as a tree for the establishment of a wall. If it also displays flowers or other parts of its structure to good advantage from a side view, then surely it will do the job. It should be noted, however, that in a very large space almost any type of tree will be satisfactory by reason of the fact that at a distance perspective is not evident and all things appear to be flat.

Space is not completely formed unless there is a suggestion of a ceiling. Unfortunately, many landscaped areas are finitely broad, finitely long, and infinitely high. On a mountain-top—on the very edge of the universe, so to speak—this is an acceptable condition, but in our cities and in our garden areas this is not an acceptable condition of space. As a matter of fact, wherever people congregate or move about, there is need of the sense of seclusion or continuity of space which is attained only by an overhead cover or by the suggestion of a cover.

Here again certain trees, by the nature of their structure, are better suited to the establishment of a ceiling. Certainly the dogwoods do not qualify. A tree which forms a canopy is needed for small areas, and large, broad-spreading types are required for large spaces. The canopy over the entrance to a home might be achieved by such species as certain Oriental cherries, *Cladrastis lutea, Phellodendron amurense,* or *P. lavellei.* The last is sometimes listed as *P. amurense lavellei,* not give specific rank.

Many round or oval-headed species are so ascending in their habit of growth that they fail to suggest a canopy and, therefore, are not completely adequate in the establishment of the required ceiling.

Naturally enough, trees which are selected to form a canopy are frequently used in places where people come to rest. The patio, terrace, or park bench will be covered by such a tree; and if people can be taught to look up, a new experience is available to them. Surely a great deal of literature describes trees as they appear in outline, but who writes of the pleasures of looking up into them? We have committed a crime of omission, and it is high time that we review trees with an eye to selecting those which are for one reason or other interesting when viewed from below. Consider the variety of interest which can be observed in the staghorn sumac, Kentucky coffee-tree, Japanese angelican tree, and so on. This appeal is made primarily for those relaxed people who prefer to do their observing of nature from the prone position.

When we speak of space, we speak of more than simple area. Walls and ceiling must be present along with an agreeable ground pattern in order to achieve a sense of seclusion and other attributes mentioned below. There is one significant byproduct, however, which should be featured at this point, and that is the effect that an overhead cover has upon the landscape about it.

Imagine standing in a meadow and viewing at some distance a fine composition of trees adjacent to a stream. Actually the trees, when viewed in silhouette against a tremendous plane of sky, appear to be relatively small in the total composition. Now change the situation and imagine yourself to be standing under a spreading tree which masks out most of the sky. You will observe that by eliminating the sky as a distracting influence, the trees will appear to be considerably more important in the total composition. Furthermore, the composition will change from one that is very tall to one that is very broad and, therefore, in much better agreement with the nature of the land.

Once space forms have been developed by trees or structures, or by a combination of these in an urban situation, new experiences await the observer. Trees that make up the space, and other trees that might be included within

Japanese angelica tree *(Aralia elata)*, with a somewhat tropical appearance, furnishes an airy canopy. It is hardy in the North.

the general space, serve as a frame of reference by which the observer may judge his position, his motion, and the size of the space in which he is wandering.

Imagine a man walking across a thousand-acre meadow. Once he has left the near boundary, he loses himself in this unmodulated space. Until he reaches the far side of the meadow, nothing has happened. At no time during this crossing has he been able to judge his position adequately in this area, nor has he been able to perceive his motion. Likewise, judging the size of the area and the distance to be traveled becomes quite difficult. Surely this man has our sympathy, for he is indeed engaged in a very dull pursuit. If, however, we distribute a number of trees throughout this meadow, then our friend will be released from a problem. The existence of the trees gives him something to do en route. He walks under and around trees; he walks in and out of secondary spaces; he observes his position relative to tree masses, and he observes his motion in the apparent movement of the masses about him. In general, trees make life a great deal more interesting in the pursuit of routine affairs.

Phellodendron lavellei is another good choice as a canopy, whether for sheltering cars in a park, the entrance to a home, or a patio or terrace.

Daily routine is characterized by a sequence of events implying movement on the part of the observer. If, in this movement, a sequence of events occurs—if the observer passes from one space form to another—then, surely, a change in the nature of the trees is suggested. Too often, in spite of changes in architecture, size and placement of structures and obstructions, the trees along the streets remain the same, block after block. A much better solution to the problem that is presented by the variety of architecture characteristic of our cities would be the introduction of an everchanging space pattern through the use of several different species. This requires more planning and a much more detailed examination of the site, in order to exploit whatever interesting features the site may have to offer. Our streets and city parks will not be made more interesting by attempting to give "unity" to an architectural hodgepodge. Nor, on the other hand, will our countryside roads be made more beautiful by super-imposing a continuous single species across numerous different ecological situations.

It is really quite obvious that plants express the same physical qualities that may be observed in structures. In architecture, in addition to space forms, we have great range of materials and structural systems which dazzle the eye with seemingly infinite variety of color, texture, and form. Surely, it is not necessary to draw a comparison between each of these physical qualities of architecture and

Cornus kousa chinensis, with luxuriant foliage and flowers from the ground up, makes a fine wall for an exterior space.

the corresponding physical qualities of plants. However, since it must be admitted that all things in a landscape are observed against some particular kind of background in a particular existing condition of space, it behooves planners to give careful consideration to those various backgrounds and conditions of existing space in order to make the best possible selection of the plant material needed to complete the plan. Too often a good general plan fails to come up to expectations, because the plants selected to implement the plan are structurally in disagreement with the intent of the planner. So let us take a careful look at three easily distinguishable structural types. I give as illustrations plants which are not complicated by an exhibition of two or more contrasting structural characteristics.

The first type gives a generally ascending effect, and it is typified by such species as Mugho pine, Meyer juniper, Cornish health (*Erica vagans*), and New Zealand flax (*Phormium tenax*). The structural character is quite independent of the form of the plant. A plant with an ascending effect may have the form of an Italian cypress, but it may also be round, square, or flat as a door mat. Thus, it should be observed that the ascending quality of the plant may be established by the stems, branches, leaves, buds, flowers, or fruit. It should also be observed that the structural character of a plant may change gradually from one type to another during the growing season, or change abruptly in the fall or during the blooming season.

The second structural type has a descending effect. This quality is observed in such plants as the weeping willow, Amur cork tree, spiderleaf Japanese maple, Irwin barberry, and pieris. Here again, the structural quality is independent of the form.

Italian cypress

The third readily distinguishable type has a horizontal or arching quality which is typified by Pfitzer juniper, Eley crabapple, and warty barberry. To this group, and the two groups mentioned previously, might be added all the intermediate forms and apparent contradictory structural qualities which make the complete classification of plants, according to structure, such a "sticky" business.

Thus, it would appear that we are approaching the area of plant composition which is, incidentally, the most complicated subthesis thus far encountered, and it is certainly not within the scope of this article to explore the topic completely. A simplified statement can be made which should suffice for our purpose.

Assuming that space forms have already been established by trees or structures, and assuming also that the general space forms may have been further divided into

A plant with an ascending effect may have the form of the Italian cypress *(Cupressus sempervirens)*, or it may be round like the mugho pine *(Pinus mugo mughus)*.

The weeping willow *(Salix babylonica)* is an example of the structural type that has a descending effect.

secondary spaces, we are faced with the problem of selecting plants which will complement architectural forms, look well together, and implement the intent of the plan. The intent of the plan implies the intelligent selection of trees for defining space forms and establishing canopy wherever necessary. The other two problems must be taken together.

Keeping in mind that even trees are observed against some kind of background—architectural or vegetative—the planner should proceed to select plants which will, for one reason or other, meet the following conditions:

1. Appear in the strongest possible contrast with the background.
2. Appear in the least possible contrast with the background.
3. Appear as a combination of the above.

The deliberate use of the materials which display strong contrasting physical qualities results in the boldest expression that could possibly be made. A tree with strongly ascending stems and branches, as Amanogawa cherry or sentry maple, is the strongest possible contrast with a wall characterized by predominantly horizontal lines. A plant of very coarse texture is in strong contrast with a fine-textured wall. Color likewise can be exploited to attain the maximum contrast. The use of plant material in this manner results in a simple, readily comprehensible, and exciting composition. Surely there is nothing subtle about contrast.

It should be noted that reference here is to establishing a particular compositional effect which is determined by the observation of a plant against a particular background. If several species are to be employed in this situation, these should not be in strong contrast with one another. As a matter of fact, the several species should be quite similar to one another in at least one structural quality.

With reference again to the background, a tree might be selected that establishes rapport with its surroundings. In

terms of color eucalyptus might be used with pastel shades; a vine maple (*Acer circinatum*) might be displayed against a fine-textured wall of predominantly horizontal lines. If several species are necessary to the composition, these species should have dominant structural characteristics in common.

To illustrate this point, and the one previously made, we might examine the floral characteristic of the Oregon-Washington coast. In this area, several species are almost continuously associated. These include the shore pine (*Pinus contorta*); Pacific wax myrtle (*Myrica californica*); box blueberry (*Vaccinium ovatum*); salal (*Gualtheria shallon*); and *Rhododendron macrophyllum,* along with other subordinate species. These plants, it is generally agreed, present a very handsome composition of plants, and the question arises—why?

Actually this group of plants represents considerable variety of forms, structural characteristics, colors, and textures. Each has the ability to form a continuous mass with its neighbors. Unlike some species, such as alpine firs, these plants make no effort to maintain their individuality; they tend to merge into a single mass. In color, there is considerable range from the dark green of the pine to the bronzy hues of salal and blueberry. In texture, the very fine texture of the pine and blueberry contrasts with the relatively coarse texture of the salal and rhododendron. It might be concluded that these plants represent a borderline case—almost too much variety. However, there is one characteristic that each of these plants has very much in common; the leaves of each are arranged on the stem in an ascending manner. The leaves of the blueberry, wax myrtle, and rhododendron are arranged at almost the same angle to the ascending branches. Furthermore, the leaves of the salal are ascending, and the ultimate directional quality of the leaves of the pine is likewise ascending. This I believe is the key factor, the final touch that gives real character to this composition of plants.

And now, without having so stated, we might justifiably conclude that neither an attempt at complete harmony, nor an attempt at complete contrast will solve all our compositional problems. Almost inevitably a combination of contrasts and harmonies will be required and, I believe, that the structural qualities discussed above will prove the feasibility of combining unlike materials. I feel very strongly about this matter of selecting plants of similar structural characteristics, so I give emphasis to it by stating that, in my opinion, compositions of plants of similar structural characteristics have a much better chance of being aesthetically acceptable.

Now, I ask two simple questions. Is it not true that trees are of primary importance in the development of space forms? And is it not necessary for us to regard these materials without emotion, much as an architect regards concrete, brick, steel, or wood? Surely, if we play favorites, if we use but a few we know well, then we shall never quite succeed in implementing our plans, nor shall we succeed in developing a composition that is fully comprehensible.

ROSES IN THE HOME LANDSCAPE

By GEORGE M. HART

Mr. Hart is Garden Consultant of The Conard-Pyle Company, West Grove, Pennsylvania.

ALL TOO FREQUENTLY landscape nurserymen and home owners alike have followed established patterns in landscape design and have restricted their use of plants to those uses already in vogue. This has been the fate of the rose—to have been confined to the garden and not to have been employed widely in landscaping, for which it is so well qualified. No other relatively hardy plant, which can be grown successfully from Canada to Mexico, from the Atlantic to the Pacific, will bloom from spring until freezing weather. No other flowering plant will serve in so many ways, such as groundcover, hedge, border, fence, screen, and as a garden and lawn specimen. No other flowering plant has such a range of colors and types of blooms, as well as habit of growth, as does the rose. Yet with all these qualifications, the rose is seen in more or less formal gardens in ninety per cent of home and public plantings.

In failing to use the rose to the fullest extent in creating continuous interest and color in a landscape scene, the nurseryman does an injustice not only to himself and his work, but to his client. The home gardener in not using the rose to its fullest advantage loses the pride of accomplishment he could otherwise have enjoyed.

Today the most widely planted type of rose is the Hybrid Tea, which has, in the past, been the mainstay in rose gardens and which is responsible for the popularity of the rose. The Hybrid Tea is noted for the production of large, well-formed, individual blooms, usually one to a stem. The stems are normally quite long and enhance its value to the home owner as a cut flower. That the Hybrid Tea need not be limited to rose gardens is usually overlooked. It can be used to form tall borders and screens, and to furnish color which will enliven many different plantings. It may also be used to border drives and walks and as a background to lower-growing roses, such as Floribundas, or even Miniatures.

Keep in mind that several plants of each type arranged together in a bed or border present a much more desirable appearance than an assortment of individual types or colors in a heterogeneous mass. It is also well to remember that the Hybrid Tea is a little more demanding in its maintenance requirements than some of the other rose types, so it should not be located in inaccessible places where maintenance is difficult or impossible. In planting Hybrid Teas, allow from twenty to thirty inches from the center of one plant to the center of the next plant. Also, for ease of maintenance, restrict the bed to a width of five to six feet, which will allow for three rows of roses for mass-color effect.

The Floribunda has been increasing in popularity each year until this type is now second only to the Hybrid Tea in the extent of its use. The name "Floribunda" implies an abundance of blooms borne in clusters and in a continuous succession. Normally a low-growing compact plant, it lends

Upper left. A bed of Hybrid Tea roses is the focal point at the foot of a broad stairway.

Upper Right. A climbing rose has been trained to grow up a pillar and along an iron chain.

Below. The variety 'Mrs. R. M. Finch', trained as a tree rose, is an attractive accent in a rose garden.

itself very well to many uses in the landscape. It is ideally suited as a border plant to a patio, driveway, or walk. It makes an excellent edging to a shruberry, a rose garden, or evergreen planting. It can be used to form beds of solid color at the entrance to and in gardens and, in view of its low-growing habit, can be planted in rock gardens to add a little height and a great deal of color. The more or less informal nature of the Floribunda lends itself very well to naturalistic plantings and in borders having free-flowing lines. In such plantings, large quantities of one variety should be selected for mass-color effect. A more recent use of the Floribunda is that of a hedge-plant; indeed, because of its low, compact-growing habit it provides a very satisfactory flowering hedge. In the planter boxes that are built into the foundation of the modern ranch-style home, the Floribunda can be relied upon to furnish pleasing color. Like that of the Hybrid Tea, the color range of the Floribunda is very wide, for there are many shades and blends running from purest white through yellow to deepest red.

The planting distance for the Floribunda is the same as that for the Hybrid Tea, that is, twenty to thirty inches.

The newest of the rose types, the Grandiflora, was developed by crossing the Floribunda and the Hybrid Tea; it embodies the good qualities of each of its parents. Inasmuch as it is a relatively tall-growing type, it cannot be planted for a low hedge or low border, but it can be used for all the other locations where the Floribunda or the Hybrid Tea is suitable. The Grandiflora has the additional feature of providing, because of its height, an excellent background for the other types of roses in a garden. The Grandiflora produces its bloom both in clusters as does the Floribunda and singly as does the Hybrid Tea. The flower is much larger than that of the Floribunda and more finely formed, like that of the Hybrid Tea. The stems of the Grandiflora are usually quite long, an advantage when used as a cut flower. The home gardener can select varieties from a wide range of color.

(Continued on page 173)

GROWING NEWER AND BETTER HOLLIES

By ROBERT B. CLARK

Mr. Clark is Assistant Director of the Bayard Cutting Arboretum at Oakdale, Long Island. For a number of years he was a member of the Department of Ornamental Horticulture, College of Agriculture, Rutgers University, and was especially concerned with its holly collection. Mr. Clark is active in several organizations, including the American Association of Botanic Gardens and Arboretums, New Jersey Federation of Shade Tree Commissioners, Hortus, and the Holly Society of America.

SINCE WORLD WAR II gardeners have been growing holly in number and variety. Until recently, however, few of the available kinds were bred for particular qualities. Today clonal plants are offered by nurserymen, and in a few years only named varieties will command a market. What is the reason for this remarkable interest in holly? I attribute it to the fact that holly has everything—almost, plus the challenge to grow it superbly.

About five hundred species of holly are known to occur in the tropical and north temperate zones throughout the world. Their common characteristics include simple alternate leaves with spiny or toothed (rarely smooth) margins and small flowers in axillary cymes, mostly of single sex on separate plants. Some species are polygamous. Aside from these characteristics, which distinguish them as members of the genus *Ilex,* hollies manifest great diversity of form, flower, fruit, and foliage. Cultivated hollies may be assigned to three categories: evergreen-leaved with red (or yellow) berries; evergreen-leaved with black (or white) berries; and deciduous-leaved with red (or yellow) berries.

Hollies differ horticulturally according to the type of wood upon which the flowers arise. This condition has a bearing on the display of berries. The flowers may be borne either on shoots of the current season or on wood that was developed the previous year. American holly, inkberry, and deciduous hollies are examples of the first group, whereas English and Chinese hollies and yaupon typify the second group. The sex of the plants can be determined among these latter hollies in late fall, because the flower buds are evident in the leaf axils: few buds indicate pistillate (female) flowers; many buds signify staminate ones. Those hollies that bloom on new wood remain a mystery sexually until they produce their flowers: the staminate flowers carry four yellow powder-puffs, the pistillate ones a green wart-like structure.

Only the pistillate-flowered plants bear the fruits, and then only if certain conditions are favorable. The following checklist may be helpful in determining why hollies fail to bear berries:

Plants have to reach the flowering state. Newly planted hollies sometimes require a year or so to become established before setting their flower buds; or they may be in the vegetative or rapid-growing condition; or the site may be too shady.

Generally speaking, hollies must have plants of both sexes for effective pollination.

A. *Both sexes must flower at the same time.* It seems not to matter whether hollies are of the same species as long as they bloom together.

B. *Plants must be close enough together.* The range of a bee's flight governs the distance between plants; a quarter of a mile or a long city block is a safe limit. Unless the pollen is transferred to the stigma of the pistillate plant, no berries are likely to develop. One device is to set a sprig of blooming male flowers in a container of water under the tree, or to tie it to a branch.

Bees must be present and working. Honeybees are the usual agents in the pollination of hollies. The weather during anthesis must be favorable.

Evergreen hollies will grow far beyond their natural range, provided they receive preferred treatment in the face of adversity. Three conditions are paramount: full summer sun with adequate supply of moisture during the growing season; protection of the foliage from direct winter sun and wind; and the soil kept moist in the winter without becoming waterlogged. Careful placement of evergreen hollies satisfies the first two requirements, while a well-drained soil and a wood-chip mulch fulfill the third. In order to select the best site, observe the shadow patterns in winter and summer. The north or northeast side of a structure or of deciduous trees is an ideal location. Evergreen boughs or discarded Christmas trees stuck into the ground on the windward side afford protection against drying winds in late winter. A screen of green Saran mesh is neat and efficient.

The following fifteen species of *Ilex* are adaptable to many eastern gardens; the first twelve are evergreen.

American holly, *Ilex opaca,* with red berries and spiny dull green leaves, is *the* holly to most Easterners. The tree ranges from the Gulf States northward in the southern Appalachian Mountains and onto the Coastal Plain to Cape Cod. It attains great size and age. In home gardens it becomes a small conical tree twenty feet tall, when it is spaced

American holly *(Ilex opaca)* stands at the end of the Holly Walk in the Royal Botanic Gardens, Kew, Surrey, England. The walk, about one half mile long, is double-planted with English holly *(I. aquifolium).*

Left. *Ilex aquifolium argentea marginata.*

Below. *Ilex verticillata.*

twenty feet apart. Scarlet-berried clones are preferred. 'Manig' and 'Old Heavyberry' are choice selections for specimen planting. 'Hedgeholly' withstands shearing to form a satisfactory hedge. Since staminate flowering trees are needed, I suggest 'Brown No. 9', 'David', 'Ed Thomas', and 'Nash'. All have excellent foliage and furnish copious pollen. They are fragrant in flower and handsome in foliage throughout the year.

In the South the dahoon, *Ilex cassine,* is attractive with its smaller berries and less spiny leaves. The hybrid clone 'East Palatka' is justly popular for its heavy crop of bright red berries.

Soyogo holly, *Ilex pedunculosa,* suggests a pear tree with three cherry-like red fruits on long stalks. The leaves resemble those of the pear, being somewhat oval and only slightly toothed. The tree, narrowly upright in form, is rather long in attaining a height of ten to twelve feet. Because of its form, it is best used as an accent plant in the shrub border. Eastern China and Japan are the native lands of this exceedingly hardy holly.

Myrtle-leaved holly, *Ilex myrtifolia,* is a slender-stemmed, narrow-leaved, small tree growing on the southern Coastal Plain. It bears fruits in various shades of red and yellow. The plant is so refined as to make an excellent hedge wherever it proves hardy.

A red-fruited, small-leaved holly which will grow in the North is much to be desired. The Yunnan holly, *Ilex yunnanesis,* would seem to fill the requirements perfectly. It is not yet widely grown. Since it is narrowly upright in habit, this species should make an excellent screen to divide sections of the garden.

The popular concept of holly is the Christmas or English holly, *Ilex aquifolium,* originally from England and southwestern Europe, with red berries amid spiny glossy leaves. This species does not adapt to the harsh eastern climate, so unlike the gentler European climate. It thrives in the Pacific Northwest. Several named varieties, however, perform acceptably as far north as New York City: 'Jan Van Tol', 'Camelliaefolia', 'James G. Esson', and *I. aquifolium balearica. I. aquifolium* var. *bacciflava* is yellow-fruited and *I. aquifolium* var. *argentea marginata* has leaves edged white (or silvery). This latter variety requires protection from wind in late winter to succeed in eastern gardens.

A most distinctive seven-spined leaf is borne by the Chinese holly, *Ilex cornuta:* four at the corners pointing out, two at the waist, and the terminal one depressed. The red berries arise in axillary clusters on sometimes long stalks. This species shows the ability to develop berries without pollination. The fruits often fail to turn red by the holiday season, sometimes turning black or shrivelling by the first frost. Various hormone sprays have been tried unsuccessfully to stimulate normal color development. The surest method is through natural pollination. The Chinese holly is not well adapted to northern latitudes; its survival north of Philadelphia is uncertain. As with the English and Japanese hollies, this species shows remarkable variation. The clone 'Burfordi' has been selected for its spineless glossy foliage and hardiness. 'Rotunda' is a compact form suitable for a low hedge or cushion-type specimen up to five feet tall. A yellow-fruited form, 'D'Or', is available.

Perny holly, *Ilex pernyi,* called a "graceless little dumpy shrub" by Reginald Farrer, is the hardiest of Chinese hollies. Its leaves resemble those of *I. cornuta* but are smaller, and the terminal spine is longer and less depressed. The regularly placed leaves are decorative but conceal the red berries. Hybrids of this and *Ilex aquifolium* have yielded the superior clones 'San Jose' and 'Brilliant'.

Tsuru holly, *Ilex rugosa,* is a red-fruited, low-spreading plant of refined foliage. It comes from northern Japan. Many of Mrs. F. Leighton Meserve's hybrids are derived from this and the English holly. Superb glossy dark green foliage and tidy habit make them ideal for the intimate border planting. The species itself is suitable for a rock garden.

The coarsest-textured leaves of all hollies occur in *Ilex latifolia* from China and Japan. Sharply toothed, broad blades, which are up to six inches long, make the tara holly conspicuous, When established in a protected site, it bears

CULTIVATED HOLLIES

Common Name	Scientific Name	Range	Height	Flowering Wood
I. Evergreen-leaved, red-fruited.				
American holly	*Ilex opaca*	America	50 ft.	New
Soyogo holly	*Ilex pedunculosa*	Asia	10	New
Myrtle-leaved holly	*Ilex myrtifolia*	America	8	New
Yunnan holly	*Ilex yunnanensis*	Asia	6	New
English holly	*Ilex aquifolium*	Europe	20	Old
Chinese holly	*Ilex cornuta*	Asia	20	Old
Perny holly	*Ilex pernyi*	Asia	6	Old
Tsuru holly	*Ilex rugosa*	Asia	2	Old
Tara holly	*Ilex latifolia*	Asia	10	Old
Yaupon	*Ilex vomitoria*	America	10	Old
II. Evergreen-leaved, black-fruited.				
Japanese holly	*Ilex crenata*	Asia	10	New
Inkberry	*Ilex glabra*	America	10	New
III. Deciduous-leaved, red-fruited.				
Common winterberry	*Ilex verticillata*	America	10	New
Finetooth holly	*Ilex serrata*	Asia	8	New
Mountain winterberry	*Ilex montana*	America	20	New

the largest clusters of flowers of any *Ilex.* This plant is a conversation piece, for it certainly does not suggest holly.

Yaupon, *Ilex vomitoria,* does have medicinal properties, but its real value is that of a landscape plant in the South, where it becomes a superb fruiting hedge or screen. The small scalloped leaves and glossy red fruits cover the stiff grayish branches.

Japanese holly, *Ilex crenata,* has been widely used in landscape plantings for many years. This is an exceedingly variable species with black fruits and leaves that are often indistinctly toothed. It grows as a densely branched shrub to ten feet tall. The variety *I. crenata microphylla* has more refined foliage, and is better adapted to northern gardens. The variety *convexa* (or *bullata*) which bears cup-shaped glossy leaves, is frequently planted as a low shrub. 'Helleri' and now 'Stokes' are exceptionally fine low-growing hollies for intimate groupings. The truly dwarf among Japanese hollies is variety *mariesi* (*nummularia*) with pygmy stature and foliage.

"If Inkberry had come from Japan, people would rave about it," a friend once remarked. Inkberry, *Ilex glabra,* is an American species of the Coastal Plain. I have seen it as a hedge on Cape Cod, where it grows wild. A white-fruited form is now available. 'Hatfieldi', an upright-branched hybrid between *I. glabra* and *I. crenata,* is worth growing as a hedge or just for its neat habit.

The deciduous hollies, handsome shrubs in their own right, are overshadowed by the persistent-leaved species; but the autumn landscape is made bright by their red berries, first among their green leaves and later along their smooth gray branchlets.

Most widespread is the common winterberry or black-alder, *Ilex verticillata,* found in moist situations throughout eastern North America. The foliage turns black with the first frost, and this accounts for the common name. The winterberry with autumnal yellow leaves is the smooth winterberry, *Ilex laevigata.* This species has a restricted range along the Coastal Plain and may be confused with the black-alder. The leaves are a smooth, lustrous, paler green than those of the common winterberry. The flowers arise singly on long stalks, whereas those of *I. verticillata* are whorled on short stalks.

A fine-branched arching shrub of great charm is the finetoothed holly, *Ilex serrata,* of China and Japan. Its pink flowers are numerous. The red berries are profuse, though small; they do not remain long after frost. This delicate shrub belongs in the intimate border, where its graceful proportions can be observed.

Mountain winterberry, *Ilex montana,* is a treelike shrub, twenty feet tall. As soon as its currant-like fruits ripen in mid-September, they are gobbled by robins and cedar waxwings. This, as well as other deciduous hollies, is an excellent plant for attracting birds.

Ilex crenata 'Helleri'.

MICHIGAN STATE'S NOVEL TV STUDIO

By HOWARD W. SWIFT

Mr. Swift, Assistant Curator of Education at The New York Botanical Garden, was impressed during a visit to East Lansing with what Michigan State Universiy is accomplishing with its TV garden studio.

THE TELEVISION GARDEN that has been operated by the Department of Horticulture at Michigan State University since the spring of 1960 is undoubtedly one of the most unique studios in the world; from it thousands of people are taught simultaneously the fine points of gardening.

This is a garden with a purpose—a studio furnished with growing plants which can be featured on programs just when activity related to their culture has seasonal importance. And these plants change in appearance from week to week, as they would in anyone's garden.

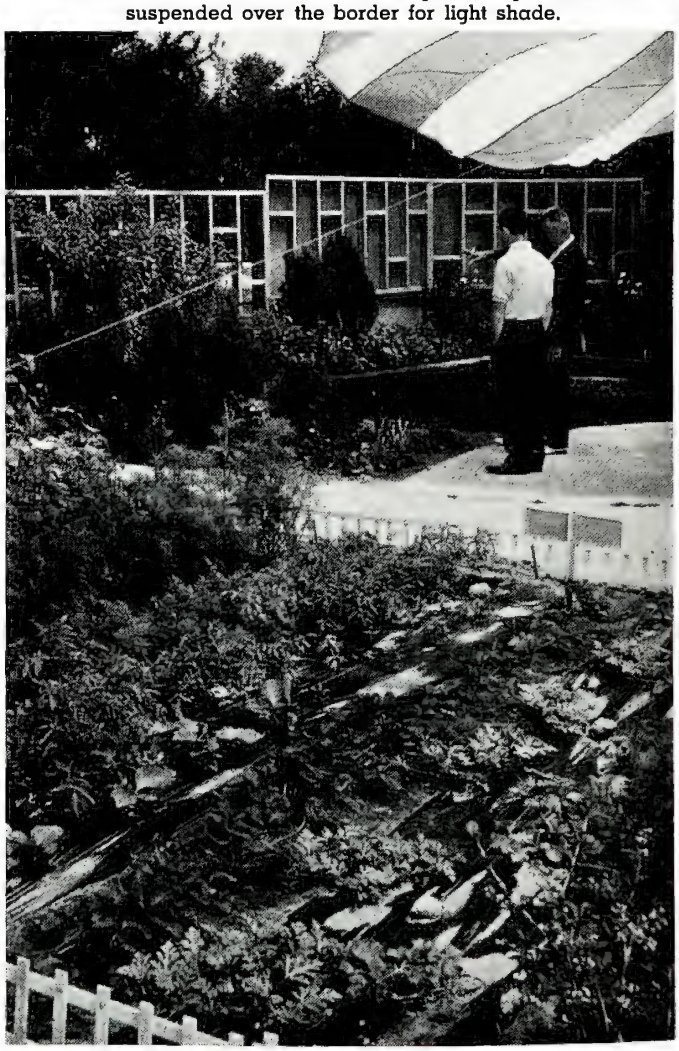
A visitor to this garden studio is surprised to find such a variety of plants concentrated in a garden area approximately fifty by a hundred feet. Here is a border, with trees and shrubs for suitable background and framing, which has space for representative annuals, perennials, bulbs, groundcovers, vines, vegetables, small fruits, and turf. Groups of plants must be near together, because most of the demonstrations are camera-recorded at short range to show detail, and spaces between plants are greatly magnified by this procedure. Not many plants of irises, peonies, chrysanthemums, and so on are required in order to show how individual plants should be lifted, divided, transplanted, fertilized, staked, sprayed, treated for insects and diseases, or mulched. The design factor becomes secondary.

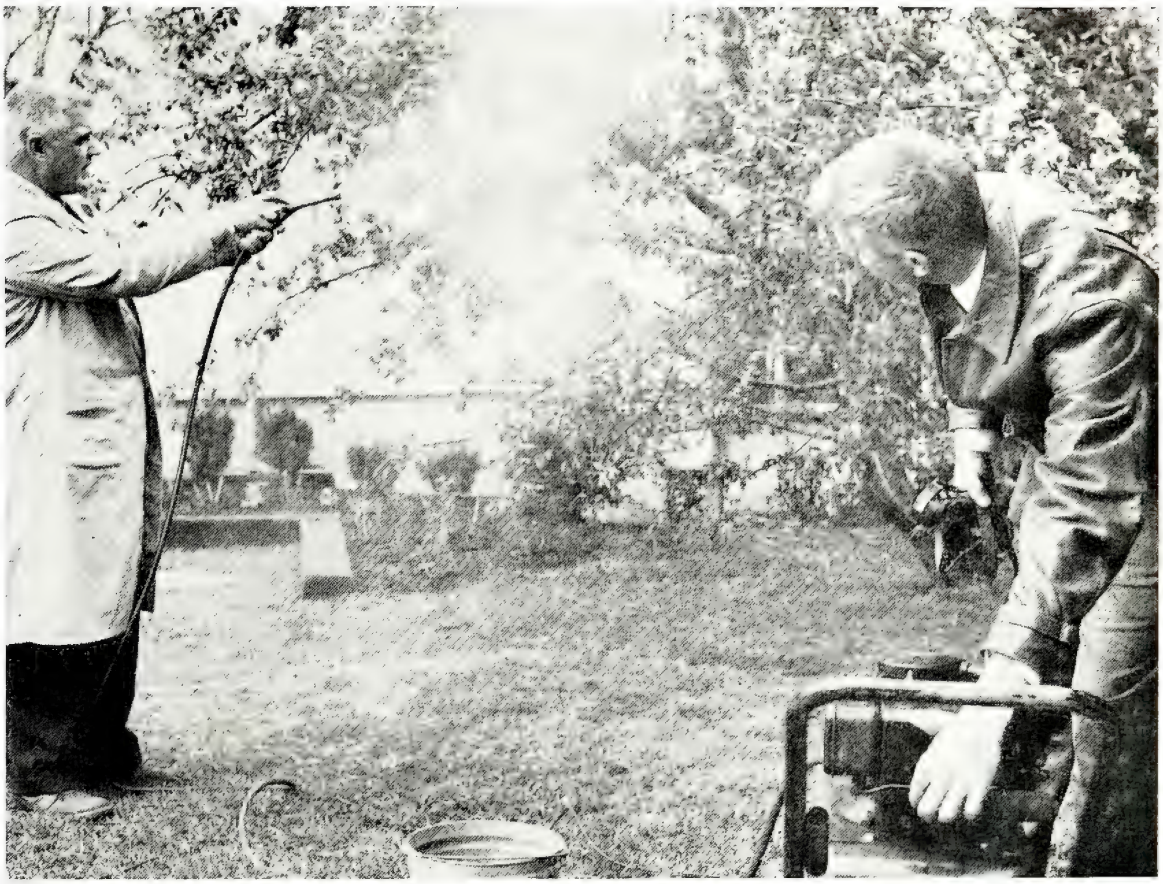
The broad concrete terrace adjoining the small expanse of lawn seems a little unusual but was a necessity—the heavy mobile cameras could not be rolled around efficiently on soft ground. Tall plants would perhaps have been the first thought for a background, but the eight-foot screen makes an effective non-reflecting backdrop against which green foliage and plant forms are shown to advantage. It is also a barrier against capricious breezes and lessens the sound of a passing teen-ager's radio at full blast, although it does not eliminate the occasional need for some prompt "ad-libbing."

Because of ever-changing and unalterable weather conditions, consideration was given to an indoor studio; but with an indoor studio it was practically impossible to create an outdoor atmosphere. There could be no camera shots

Left. A well-planned arrangement of plants makes it possible to grow a variety within the scope of TV camera lenses. Railroad ties serve to retain the sod at a level higher than the ground.

Below. Vegetables and annuals have been given a space nearby, within reach of TV cameras. The striped silk parachute is suspended over the border for light shade.





"It is done like this for complete coverage, especially under the leaves," explains Dr. Watson. In this demonstration the advantages of an outside studio are evident.

Dr. Watson answers an inquiry about the removal of blades for sharpening a rotary lawn mower, while Robert P. Worrell listens attentively.

fading into treetops, no convincing breezes or play of sunlight and shade, little opportunity for business-like watering and spraying. Without a lot of indoor space, it would have been difficult to arrange for rapid sequences in order to fit as much informative teaching into a comparatively short period as is possible in the open. There were also the occasional problems of clumsy props and of authenticity in the demonstration of equipment. The criss-crossing cables and rather conspicuous neck-microphones were not the least annoyances to smooth programming. The first of these problems was often overcome by the use of pocket transistor radios with their antennas extending down trouser-legs and fastened to a shoe to reduce undesirable sound interferences. The cables became less of a problem when the sequence of demonstrations progressed from right to left or left to right. This unique outside studio was the answer —but only after many headaches and innumerable major and minor alterations of plans.

The studio was brought into being and started on its successful operation through the persistent efforts of Donald P. Watson, Professor of Ornamental Horticulture at Michigan State University, with the backing of the Department of Horticulture and the Cooperative Extension Service at East Lansing. Financial assistance for the initial broadcast from the studio was furnished by the Michigan Association of Nurserymen. Local commercial organizations helped generously by providing many required plants and other props.

A first decision was that these TV broadcasts from the studio should be timely, presenting week-by-week garden activities which would be accurately seasonal. Handling the details in order to have programs available for use by five stations (live or taped) on appropriate dates and in popular viewing times were made crucial by a week-and-a-half delay between the original live broadcast and the last showing of a taped recording of the program in the Michigan area. To cope with this, plants sometimes had to be selected in advance, forced into flower in the greenhouse, and photographed before the season when they would normally be at their best in local gardens.

It is commendable that detailed discussion and demonstration covering so many kinds of garden activity were successfully included in the first series of twelve TV broadcasts in twenty-eight–minute weekly periods. These included various phases of pruning; spraying; handling of garden plants from seeds and bulbs; soil preparation; fertilizing; planting of woody and herbaceous plants; seeding, sodding, and weed-control which are necessary considerations in making and caring for a lawn; pointers on growing vegetables and small fruits; uses of coldframes and hotcaps and protection of plants with plastic; hand and power sprayers and lawn mowers; watering; and mulching. Beside these very practical subjects, considerable time was spent on garden planning, selecting plants, utilizing garden space to meet family and individual needs and preferences, simplifying garden work and reducing maintenance costs, and on suggestions for garden lighting.

In these programs, Professor Watson has played the role of an experienced gardener assisting a neighbor who is eager to learn preferred methods of planning for and managing a garden. Guests were also included on the programs

A dress rehearsal for TV, on the winter protection of a Floribunda rose, encounters all the qualms of a stage production.

Sometimes a little faking is necessary; here stalks of asparagus are being stuck in the soil to look as though they were sprouting normally.

A hybrid blueberry, growing in the required acid soil, is isolated by a submerged tub. Black plastic is used as a mulch to control weeds and reduce excessive evaporation of soil moisture.

from time to time: a housewife (no explanation of what she did with the transistor-radio antenna), a flower arranger, a landscape designer, among others.

Programs from the Michigan State University TV Garden continued during 1961 and into 1962, with great improvement in techniques. The stations broadcasting these programs since 1960 have been WJRT (Flint), WILX (Lansing), WJBK (Detroit), WKZO (Kalamazoo), WMSB (Lansing). Beginning on May 13, 1962, a series of spring programs were broadcast over WNBC, Channel 4, at ten o'clock on Sunday mornings, and the response has been very enthusiastic.

Although the expense is great (approximately sixteen thousand dollars for a series of twelve programs), the scope of instruction on gardening and related subjects on TV is practically unlimited. It is a dynamic means of reaching many thousands of gardeners and potential gardeners and of teaching some of the ways and means for developing one of America's most popular and most valuable hobbies.

ROSES (Continued from page 166)

The fourth type to be evaluated for landscaping is the shrub, an older type to which there has been recently added some glamorous varieties. Most of the shrub roses have the extremely desirable qualities of hardiness and disease-resistance. This relieves the gardener of the necessity of spraying them regularly and permits their use among other plants and in out-of-the-way places where they may be somewhat neglected without suffering ill-effect. Shrub roses may be planted in flowering shrub borders, among evergreens, in perennial borders for background effect, and in rock gardens. They make excellent specimens on the lawn or at entrances to gardens. Their most important use, however, is to form hedges, and this they do to perfection. Most shrub roses attain a height of from four to six feet, bloom constantly all season, and are extremely hardy and tolerant. If they are spaced two to three feet apart, they will soon form a solid hedge.

While the groundcover type of rose is limited to that particular phase of landscaping, it performs a worthwhile service in covering sunny slopes on which it would be difficult to maintain grass. The desirable feature of the groundcover rose, as compared to other groundcovers, is its larger, more attractive blooms and the fewer plants required for coverage. Spaced from three to four feet apart, they will cover an area very well.

Climbing roses are generally grown on fences, arbors, trellises, and on walls. Trained to such structures, they are very colorful additions to any landscape picture. There are, however, several less common uses to which the climber may be applied. One of these is to train two or more climbers to a post, or to another tall, narrow framework, so that they will completely cover it and simulate a pylon effect. This serves as a unique but attractive accent feature in a garden or border planting. Another way is to construct a series of arches over a garden walk and to train a climbing rose to grow over each arch from each side. These arches will become a very beautiful sight, especially if planted with the newer everblooming climbers. Climbing roses may also be planted to cover an objectionably rough slope, to conceal a large tree stump, or to beautify the side of an unattractive building.

The aristocrat among the rose types for landscaping is the tree rose, with its standard or trunk three to four feet tall, supporting a widely branching head of flowers and foliage. The head can consist of almost any type of rose, since it is obtained by bud-grafting to the standard or trunk. The head may be rounded or almost globe-shaped, when the Hybrid Tea or Floribunda is used, or tall and upright when the Grandiflora is used in grafting. A weeping effect may be had by grafting the climbing rose to the top of the standard or trunk. The color of the flowers of the tree rose is determined by the variety of the rose used in the bud-grafting. Tree roses are attractive features at entrances, along walks and driveways, and as focal points in gardens.

Last, but least only in size, is the Miniature, the gem of the rose family. This rose attains a maximum height and spread of only ten to fifteen inches. It is hardy out-of-doors. It can also be grown indoors in winter in a window garden. Tiny buds, scarcely larger than a grain of wheat, produce blooms three quarters to one and a quarter inches across, in profusion. Miniatures are available in wide variety to suit almost any situation. They are excellent plants as edgings to walks, at the base of a sundial or bird-bath, in window boxes and planters of all types, and in rock gardens.

Miniature tree roses are available on tiny standards only a foot tall. Some gardeners have combined miniature bush roses with miniature tree roses in attractive, small-scale gardens; these are a particular delight to children and often stimulate their interest in gardening at an early age. The blossoms from both tree and bush Miniatures make dainty boutonniers and arrangements for special occasions.

Come into the garden, friend, for we adore it and
wish to share its treasures with thee;
We feel did thee know its secrets and charm,
it would make thy world-worn soul care free.
For, friend, a garden close is a place of delight,
filled with fragrance and beauty wondrous lovely.

LYMAN

STRAWBERRIES

HISTORY AND DEVELOPMENT

By DOROTHY EBEL HANSELL

THE STRAWBERRY HAS BEEN grown as a garden plant for only six hundred years or so, a relatively short time when compared with other fruits. While the date of the introduction of the strawberry to cultivation is usually given as the fifteenth century, E. A. Bunyard in his paper, "The History and Development of the Strawberry," which he read before the Royal Horticultural Society on October 7, 1913, writes that there is evidence that it was grown in France in the Royal Gardens of the Louvre under Charles V in the latter part of the fourteenth century. The word strawberry (*Fragaria vesca*) was valued in those days for its decorative qualities as much as for its fruit. This is the species that the early herbalists wrote about, noting its medical properties rather than its culinary uses. It is the one mentioned by Pliny and the one that Vergil referred to in these lines:

"Ye boys that gather flowers and strawberries,
Lo, hid within the grass, an adder lies."

Not until sometime after the introduction of the American species, *F. virginiana,* to Europe in the early seventeenth century, probably by the botanist Tradescant, was any interest taken in improving the quality of the strawberry. Some new varieties appeared in the early 1800's, but their berries were not remarkably larger and their flavor was not considered an improvement on that of the original type. With the introduction of *F. chiloensis* from Chile, first to France, then to England, larger fruits were obtained from seedling plants. The development of the strawberry, as we know it today, began by crossing seedlings of *F. chiloensis* and *F. virginiana.*

One of the men to whom much of the credit for the modern strawberry belongs is Thomas Laxton of England. He conducted experimental work in cross-breeding peas in the 1860's; then he concentrated his attention on the strawberry and produced some outstanding varieties in the 1880's and 1890's. Laxton set a high standard for future strawberry breeders. The varieties he originated were in demand for many years on both sides of the Atlantic.

Meanwhile in the United States work was being done to improve the strawberry for commercial culture. Four varieties—'Hovey', 'Wilson', 'Sharpless', and 'Crescent'— came into prominence and served as parents for the many varieties that were developed to satisfy the demand for extra-early bearers, light scarlet berries, dark crimson berries, large-sized berries, medium-sized berries, full-flavored berries, cold-resistant plants, everbearing plants, and so on. All efforts, however, to produce a desirable everbearer that would do well in the northern United States met with disappointment. (The "everbearing" habit meant a crop from late June until late September, and it took a number of years and a number of unfortunate experiences to convince northern growers that it was possible to obtain a long-season crop in the South because of climatic conditions and not because of inherent characteristics in the varieties under cultivation.) Then Samuel Cooper, a New York State grower, found the 'Pan-American' strawberry (so named because of the Pan-American Exposition, Buffalo, New York, 1901, at which this variety was exhibited for the first time) in a row of 'Bismarck' plants which he had received from W. F. Allen of Salisbury, Maryland. This was the beginning of the successful development of everbearing varieties for northern regions of this country.

'Fairfax' is a desirable early variety for the garden.

CULTURE

By FULTON W. ALLEN

Mr. Allen is one of the three sons of the late W. F. Allen, who now own and operate the W. F. Allen Co. In 1886, their father borrowed fifty dollars to buy stock plants to start a strawberry plant business. From that date until the Senior Allen's death in 1949, growing and selling good strawberry plants, true to name, were his major interests. Each of his sons, W. Lee, Albert G., and Fulton W., worked as youths in their father's nursery. In 1914, they joined him in forming the W. F. Allen Co.

THE FIRST STEP in growing strawberries is to consider the question of healthy plants. This necessitates finding a nursery that produces healthy plants free from virus and red stele. Virus is controlled by testing for virus reaction under the controlled conditions of a greenhouse; any plants showing indication of virus are discarded. The remainder of the tested plants are then propagated for basic stock from which nurserymen, who cooperate with the Bureau of Plant Industry of the United States Department of Agriculture

'Jerseybelle' is a late-bearing variety.

which does the testing, grow the nursery stocks. (A list of cooperating nurserymen is obtainable from the Bureau of Plant Industry.) Red stele may be identified by the county agent or one of his associates, in the spring of the year after growth has started in the nursery rows. For red-stele areas resistant varieties such as 'Stelemaster', 'Sparkle', and 'Surecrop' are available.

Loam or sandy loam, reasonably free from weeds and located in a slightly springy situation, or where irrigation is available, is desirable. Organic matter plowed in to a depth of seven to eight inches will improve the growth and the yield. Organic matter may be applied as a plowed-in cover crop of green weeds or as cow or sheep manure; chicken manure may be used if evenly spread. Using weeds as a cover crop may increase hoeing, but this operation is not insurmountable and, if the land is good, may be worth while.

In areas where nematodes are troublesome 'Nemagon' may be used as a soil fumigant. This application should follow the plow furrow or be made when the spaded trench is open. To get the fumigation well down in the soil where it is needed, this work should be done by two people—one applying the fumigant and the other covering with soil promptly to keep the fumigant from evaporating in the open air. After the ground has been plowed or spaded, it should be smoothed by harrow or rake to prepare for planting.

In most parts of this country, strawberry plants should be set out in March or April; if dormant plants are available, planting can be extended into May in the northern part. In fact, dormant plants which are dug in January, February, and early March and stored at about 32°F. are decidedly better than plants dug after growth has started. In thoroughly prepared ground the plants should be set eighteen to twenty inches apart in rows three to four feet apart. Large commercial planters use a tractor-drawn transplanter; but for the home gardener a long trowel or spade or spud is satisfactory. Just plunge the tool six or seven inches into the soil, working it back and forth until an adequate hole is opened; place the plant in the hole, with roots extended and somewhat fan-shaped; then push the soil around the plant so that the level of the ground will be level with the crown of the plant. This level is important. If the plant is too high out of the ground, the exposed roots will be unable to function properly; if it is planted too deep, the buds will be covered and may not develop, even though exposed leaves look thrifty. The planting should be undertaken on a calm, cool or cloudy day; too much wind is fatal to strawberry plants.

Every gardener should know that grass and weeds must be controlled. A light hoe to keep out the grass and weeds and to keep the soil loose and friable is a good tool.

If the land is rich in organic material, especially with animal manure, fertilizer may not be necessary. However, generally speaking, some chemical fertilizer, of a 4-6-0 or 4-6-2 formula, benefits the strawberry bed. This may be applied mechanically by a fertilizer attachment on the commercial transplanter or in the spaded home garden as one turns the soil. In either case, the fertilizer should not touch the roots in a concentrated form. If chemical fertilizer is not applied at planting time, it may be advisable to sidedress the rows, being careful not to let the fertilizer get on the growing foliage. Nitrate of soda or ammonium sulphate should be used sparingly, if at all, as a separate application.

Red stele and nematodes have already been mentioned. Fruit rot, which also causes much trouble, may be controlled by the application of thirty-five to fifty pounds of seven and a half per cent "Captan" dust to the acre; as a spray four to eight pounds of fifty per cent powder in one hundred to one hundred and fifty gallons of water to the acre. Grub worms, cutworms, aphis, ants, and other insects may be controlled by chlorodane mixed with fertilizer and broadcast. Sixty pounds of forty per cent chlorodane mixed with one ton of fertilizer and applied at the rate of eight hundred pounds to the acre should be satisfactory. For small plantings, one ounce of forty per cent chlorodane may be mixed with two pounds of fertilizer and broadcast over one hundred square feet of ground. For sidedressing, use one pound of this fertilizer-chlorodane mixture to twenty feet of row.

(Continued on page 191)

Nursery-stock strawberry plants are tied in bunches of twenty-five.

THE BOTANICAL GARDENS IN INDONESIA

By SADIKIN SUMINTAWIKARTA

Mr. Sadikin is the Director of Kebun Raya Indonesia, Bogor, Indonesia. He presented the following paper at the symposium on "Tropical Botanic Gardens" in the Tenth Pacific Science Congress, held at the University of Hawaii, Honolulu, August 21-September 6, 1961. The Congress was sponsored by the National Academy of Sciences, Bernice Pauahi Bishop Museum, and the University of Hawaii.

THE OLDEST and most important botanical garden in Indonesia is the Bogor Botanical Garden,* which was founded in 1817. This garden has long endeavored to establish extensions in different parts of the Archipelago. The first extension was the Tjibodas Mountain Garden, founded in 1862 on the slope of Mount Gedeh, West Java. It was successively followed by the Sibolangit Botanical Garden near Medan in East Sumatra, the Purwodadi Dry Climate Botanical Garden near Malang in East Java, the Setia Mulia Botanical Garden near Padang in West Sumatra, and the Eka Karya Botanical Garden in Central Bali, established respectively in 1914, 1941, 1955, and 1958. These gardens, together with the Bogor Herbarium, the Treub Botanical Laboratory, the Bogor Zoological Museum, the Institute for Nature Conservation, the Institute for Marine Research, the Institute for Microbiology, and a Central Library of Science all belong to one organization, namely, Kebun Raya Indonesia (the Botanical Gardens of Indonesia).

Outside Kebun Raya Indonesia two other botanical gardens have recently been established, one in Ambon in the Moluccas, and the other near Djakarta.

In addition, several provinces have frequently expressed their wish and hope to establish their own botanical gardens. With the rapid development of the regional universities, which now have a legal basis in the government's eight-year plan for university projects in each province, these provincial strivings will become more and more significant in the years to come. It is understandable that in their efforts and aspirations they will turn to the nucleus of the botanical gardens in Indonesia at Bogor for inspiration and advice, and for material help as well. This is to be welcomed, since it presents a possibility for focusing ideas and uniting all efforts in one all-enfolding plan for the whole of Indonesia.

In consequence, various questions arise: 1) Where should these botanical gardens be best located? 2) How should they be organized, what are their scope and specific aims? 3) To what extent can the Bogor Botanical Garden serve as an example?

We are of the opinion that these botanical gardens should be combined with the existing nature-reserves. The Tjibodas Mountain Garden is a good example. It has the advantage that material for the collections are directly available, and the beauty of the natural setting provides a good start in landscaping. The future of the nature-reserve itself will be safer and, moreover, such a garden may serve as a center of activities in the study, exploration, and inventory of the regional flora and fauna.

Should this idea be followed, the Sibolangit Botanical Garden could be more intensively developed. Nature-reserves which could receive this consideration are South Sumatra, near Benkulen, Sampit in South Borneo, Bantimurung near Makassar, and Mount Lokon near Menado, North Celebes.

Another opinion favors establishing the new botanical gardens in or near cities, preferably in or near the university centers. Relations with the botanical and biological re-

A scenic spot in the Tjibodas Mountains Garden, West Java.

*Formerly the Buitenzorg Botanic Garden, under which name it had a long and illustrious history.

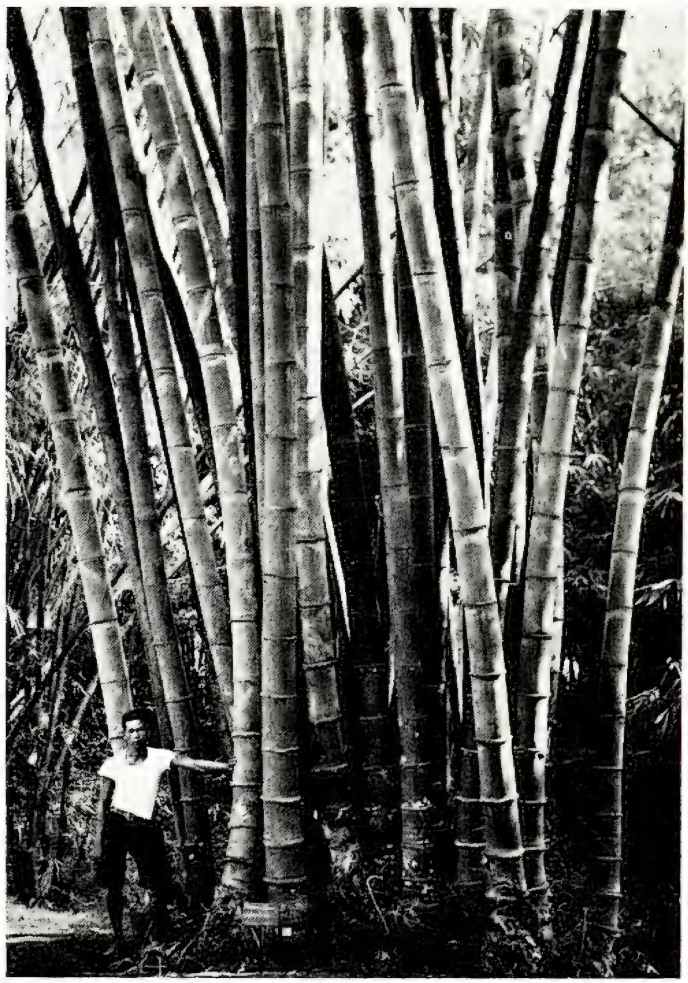
search institutes, and with other research institutes in the university centers would be much closer and a more efficient management may be achieved. The establishment of such gardens may also be an attempt to bring nature closer to the cities, thus helping to keep the current urbanization in balance.

There are doubts, however, as to whether the botanical gardens in cities would be able to obtain enough space, and whether it would be possible to build up representative collections of living plants. It is feared that such gardens might become university gardens with special educational purposes; gardens with plant collections that show all the important facts of plant taxonomy, geography and physiology; or that they might develop into recreational parks and show gardens.

Of the university centers in Indonesia those in Djakarta, Bogor, Medan, and Padang are fortunate in having or in being near botanical gardens; whereas Makassar and Menado are close enough to the nature-reserves of Bantimurung and Mt. Lokon to warrant the establishment of botanical gardens with these nature-reserves.

Regarding the organization of the new botanical gardens, we hold the view that those that are established in combination with nature-reserves should be made extensions of Kebun Raya Indonesia with Bogor as the center; or, if this should become too comprehensive, these gardens should be entrusted to the regional government. The management of the gardens that are set up in the university grounds and serve as university gardens or as show gardens and recreational parks, should be entrusted to the respective university or to the local government.

As to the scope and specific aims of the regional gardens, we should like to see that each has as a nucleus a collection of the local flora and a regional herbarium. As stipulated be-



Dendrocalamus giganteus, a giant treelike bamboo, in the Bogor Botanic Garden, West Java.

Canarium Avenue in the Bogor Botanic Garden, West Java.

Part of the palm collection in the Bogor Botanic Garden.

fore, these gardens should become the center stations for the exploration and study of the regional flora and fauna. We hope that they will stimulate research in botany and biology in general, and become an inspiration and source of fresh ideas in carrying out work in agriculture, forestry, horticulture, and gardening.

The Bogor Botanical Garden serves as an example in many ways. Its history and development reflect the progress and results of scientific research in the field of natural sciences in Indonesia. The Bogor Botanical Garden and its research institutes have always been the center and impetus of activities in botany and zoology. The Bogor Botanical Garden is actively involved in the protection and conservation of rare plants and animals that are threatened with extinction, and of their habitats. Active interest in agriculture is evident through the introduction in Indonesia of such important plants as cinchona, the oil palm, gutta percha, and rubber, and through the initiation and promotion of research in agricultural zoology and economic plants. Many agricultural research stations originated from the Botanical Garden in Bogor and have now become separate institutes. The year 1905 saw a culmination of activities, when the garden and its related research departments were amalgamated into one body and became the core of the Department of Agriculture.

Through various phases of development, reorganization, and changes of name, the Bogor Garden and its aforementioned extension and research institutes are now included in one organization under the name of Kebun Raya Indonesia of the Department of Agriculture. The Indonesian Government is now planning to unite all basic research institutes into one national research organization. It is very likely that beginning next year Kebun Raya Indonesia will become the nucleus of a national biological institute of said organization.

The task of Kebun Raya Indonesia comprises: a) the inventory, introduction, and conservation of the flora and fauna resources; and b) basic research in botany, zoology, microbiology, marine biology, and hydrology.

Four scientific journals on general botany, systematic botany, zoology and hydrology, and marine research are issued, besides annual reports, plant catalogues, seed lists, guides, booklets, and pamphlets on nature conservation.

The difficulty most perceptible at present is the great shortage, even lack, of trained and experienced personnel. Efforts are being made to increase the staff and to enable its members to further their studies at home and abroad.

Foreign scientists are welcomed to carry on research in Bogor; we learn from their findings. Kebun Raya Indonesia can offer simple facilities for accomodation and working space in its institutes to all foreign scientists who wish to study the flora and fauna of the tropical areas and particularly of Indonesia.

Amorphophallus titanum, called "the largest flower in the world," measured over forty-seven inches high and thirty-one and a half inches wide in October, 1956, fifty inches high and twenty-seven and a half inches wide in September, 1959, in the Bogor Botanic Garden.

The majestic Popocatepetl from the Puebla side.

MEXICO

By SIGMOND L. SOLYMOSY

Dr. Solymosy is Associate Professor of Horticultural Research, University of Southwestern Louisiana, Lafayette, Louisiana.

WHAT IS MEXICO? Burning hot sun in desert and chaparral at noon and the cool fragrant breeze under the trees at night. The silent talk of the mountain Indians and the cheerful loud music of the mariachis. Modest adobe chapels and splendid cathedrals. The flaming red salvia amidst the darkness of the *Abies religiosa* forest and the pastel shades of stanhopea on the rocks of the cold barranca. The heat of the tierra caliente and the icy cold of the majestic Popocatepetl. First-class four-lane highways with speeding cars and winding mountain roads with children riding a four-wheel cart packed with firewood and holding a puppy-dog on their laps. The gay and colorful country-people in the mercados of the villages and the distinguished and cultured inhabitants of the capital. Little foodstands on the street corners and first-class restaurants. The Torre Latino Americana, a glass and steel skyscraper, and the splendid Zocalo with its sumptuous palaces and cathedral that were built where the emperor Moctezuma ruled his domain. The relics of a culture several thousand years old and the comforts of modern civilization. A land of pleasure and soft music and a land of hard work and progress. This is Mexico.

In the summer of 1961 I spent a month in Mexico, collecting plants for the University of Southwestern Louisiana and for the Louisiana Society for Horticultural Research. The purpose of my trip was to search for plants of ornamental value for out-of-door use in the Gulf Coast region. Our climate is rough on plants; hot and humid from May through October; pleasant and warm in November and from February through April, and treacherous in December and January with temperatures in the seventies and eighties for days, then a sudden drop to almost freezing and sometimes below. Plants do not harden up or become dormant to withstand the cold spells, and this means that even a light frost may do considerable damage to their tender shoots.

It is easy to look for conservatory plants in a country like Mexico, but it is quite a problem to find hardy ones for our particular area. After studying the topography and climate of Mexico, I decided to explore the high altitudes of the Valle de México. I also decided to travel by car; I did not want to miss anything between the Texas border and my destination. I entered the Republic of Mexico at Matamoros; I did quite a little plant collecting in the chaparrals of Texas and wanted to compare with them the vegetation of the long stretch of chaparral extending from past Matamoros to almost Ciudad Victoria.

We left Lafayette — my wife, my assistant Gerald Davis, a senior horticultural student, and I — on the morning of June 25, 1961. In Brownsville, Texas, we visited a good friend, Garnet Burgess of the United States Plant Quarantine Station, with whom we talked about the Mexican flora, the best roads to take, and our collecting plans. He related an amusing episode: a man and his wife from the United States wanted to visit Mexico by car to admire the country's natural scenery, especially the mountains about which they had heard so much. To the surprise of everyone at the border station, the couple returned the evening of the day they had departed. They had had enough of Mexico! They had seen nothing but the same endless chaparral, just as in Texas, for almost two hundred miles — so they turned around and drove back to the United States. I must admit

The Ixaccihuatl from the Puebla Side.

that the chaparral does not offer much to people who are not interested in plants; it is a rather desolate sight wherever it may be. But had this couple driven another fifty miles, they would have reached the Sierra Madre Oriental, and there they would have seen something that they could talk about for the rest of their lives. But in humans — as in plants — there is variation within the species.

I noticed some variation within the species of *Leucophyllum frutescens,* mostly in form of leaves and size and color of flowers, but not sufficient to be considered outstanding. I did not find any plants of *Leucophyllum* with white flowers.

The white and the rose-pink forms of *Lantana macropoda* caught my attention; I believe this trailing shrub could be used profitably for hybridizing. I observed some very large *Cordia boissieri* and well-shaped *Cercidium macrum.* The chaparral is interrupted by plantations of *Agave sisalana.* Henequén, or sisal hemp, one of the few century plants with a trunk, is planted in well-cultivated rows as far as eye can see. The stiff silver-blue leaves resemble well-polished swords.

Ciudad Victoria, the capital of the State of Tamaulipas, is a typical agricultural center, dominated by a church on a steep hill just outside the city limits. Here the climb began. The vegetation changed slowly, kilometer after kilometer, curve after curve. We were still in the foothills of the Sierra Madre Oriental. I had to restrain myself from stopping and taking off into the woods, but ahead was a stretch of one thousand kilometers (600 miles) before I reached my prospective hunting grounds. The driving was slow—the road excellent but winding, the climb constant. Fifty-three kilometers south of Ciudad Victoria I could not restrain myself from stopping and looking around. The altimeter showed 475 meters (1,560 feet) and it was hot, 91.4°F. Here the soil is rocky with a layer of deep, dark brown humus; the pH reading is 6.0. Dwarfed oaks are covered with *Tillandsia recurvata.* (I found this small bromeliad growing on oaks on the Edwards Plateau of Texas in 1958.) High up behind a rock, *Hibiscus cardiophyllus* was in full bloom; close to the road, bullhorn acacia, *Acacia cornigera.* This small tree is one of the myrmecophilous plants; it serves as hosts to certain ants that live in the big hollow thorns of the tree and consume the nectar secreted by glands at the base of the petiole and the oil contained in small brown appendages at the tip of the leaflets. As soon as anything or anyone moves or touches the tree, the ants move out. Before I could count to three, my hands were full of ants. I brushed them off quickly, but then curiosity won, and I let a few work with their mandibles on my skin. Their bite was not at all painful—no more painful than that of any other small ant. On the campus of the University of Southwestern Louisiana we have an *Acacia cornigera* which blooms well, but never fruits and does not harbor any ants. I was glad to find both ants and seeds on the trees in their native habitat.

In Ciudad Victoria we met a charming high-school teacher from the State of Illinois, who was traveling with her mother. She told us about their "adventure with the bandits of Río Frío." Río Frío is a little village along the highway in the State of Tamaulipas. While they were driving toward this settlement, a panel truck with blaring loudspeakers overtook their car. All they could understand in Spanish was "bandidos" and "Río Frío." They were really frightened and thought that the loudspeaker warned the population to be on the lookout for bandits. They stopped at the next filling station to inquire. Nobody knew about bandits in Río Frío — as a matter of fact, no one had ever seen a live bandit. Although they were not entirely reassured, the two women continued their trip. Some time later they learned that the panel truck was roving the countryside to advertise a current motion picture entitled "The Bandits of the Río Frío!" Modern means of advertising have invaded the villages of Mexico.

We noticed quite a few specimens of *Salvia coccinea* in bloom. This annual is widely cultivated; it is also endemic

Fucrea bedinghausii in the Contreras canyon.

to Texas and southwest Louisiana. The Mexican plants differ from those of Texas and Louisiana, being lower and more pubescent.

After spending the night at the Covadonga a few kilometers outside of Ciudad Valles, we continued our climb toward the Valle de México. It was interesting to observe the sudden change in the flora as we passed through the high desert between Jacala and Pachuca: cacti, fouquierias, and terrestrial bromeliads. We stayed overnight in the old mining-town of Pachuca and experienced the weather of the high plateau. Soon after sunset an icy wind began to blow, penetrating to our bones. It took a few minutes before we gathered enough courage to shower and go to bed. We could have driven to Mexico City that night, but I wanted to get there in the early morning hours for the planning of my field trips.

On a magnificent cool Friday morning we arrived in Mexico City and found quarters. I immediately called upon Professor Ricardo Rodriguez-Muñoz, who was kind enough to receive me at once. He introduced me by telephone to his former professor of botany, Dr. Angel Roldán-Molina, with whom I spent most of the afternoon. To talk with this academician who knows not only the regional flora but also the history and geology of his country, was an unforgettable experience. Most graciously he helped me to plan my field trips and asked his son José Roldán-Parrodi, an excellent botanist, to accompany me. So we made a date for Monday morning.

I must also acknowledge here the cooperation I received from Enrique Gonzales, Manager of the Oxford Hotel, and his staff. They helped me to arrange transportation and followed our field trips with great interest; on coming back to the hotel at night from the mountains, I had to show them my collections.

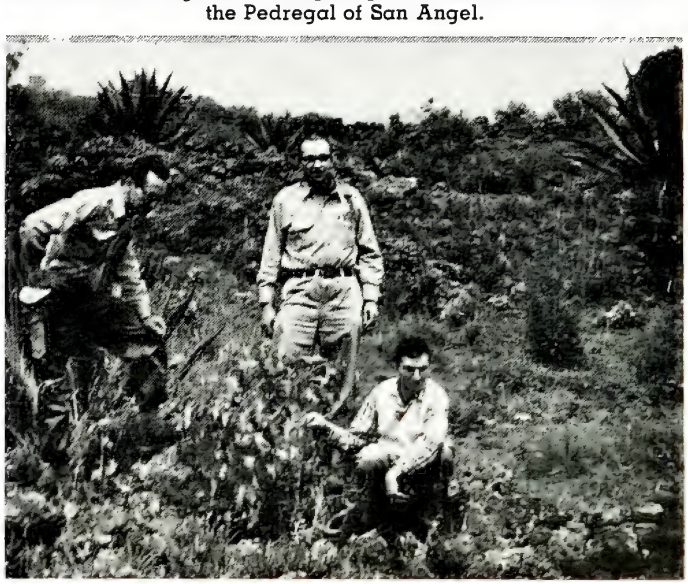
The morning of July 3 arrived: I took off with Gerald Davis to meet José Roldán-Parrodi. In a matter of minutes, we became a party of five: Sr. Roldán-Parrodi introduced us to Evelyn Bourchier, a charming member of the British colony of Mexico and an expert in medicinal and aromatic plants. We also had the pleasure of meeting a fellow-countryman who lives in Mexico, Phillip Clark, horticultural writer and enthusiastic plant-hunter. We arranged plans to explore the Pedregal of San Angel and the Contreras Cañon first.

In my opinion, the Pedregal de San Angel is soon to become a memory of the past. The big metropolis needs expansion and, looking at it with the eyes of an architect, where could one find a more picturesque setting for residential areas than this Pedregal? I only hope that the magnificent and rich flora will be preserved. It is an ancient lava field, mostly rolling land, interrupted by small flat areas and several caves of various sizes. The reader may think that a lava field has a lugubrious appearance, with its black and dark gray rock and its dark brown or black soil. In the dry season perhaps, but certainly not in the rainy season. With a general background of *Agave atrovirens, Senecio praecox* (palo loco), and the introduced and naturalized *Schinus molle* (piru), every little crevice, every rock, every piece of soil holds a variety of plants: ferns, the well-known resurrection plant (*Selaginella lepidophylla*), *Peperomia* spp., *Begonia gracilis,* (ala de angel), fiery red *Sprekelia formosissima,* snow-white *Milla biflora,* (estrellita), *Zephyranthes* spp., the vivid yellow *Celsia cretica* (introduced by the Spaniards), *Dahlia variabilis, Oxalis* spp. a number of species of *Sedum, Calochortus*, and other genera.

It is easy to collect seeds and bulbs of *Zephyranthes*; it is different with *Sprekelia.* Its bulbs nest to twenty-eight inches deep between sharp rocks. (It took me about thirty-five minutes to get my first bulb.) Dahlias are not an easy prey either: the plants grow between rocks, and the tubers are under stones and boulders. The rocks have to be lifted one by one to expose the root system.

Fortified with coffee, we continued through Tlalpan toward the Contreras Cañon. We started climbing; at an altitude of two thousand meters (6,600 feet), we stopped to look around. The air was fresh, and we enjoyed the fragrance of the *Abies religiosa* forest. The Contreras Cañon is not dry and bare; it is wet and densely covered with lush vegetation, and the slippery rocks caused us to be very careful. To my great joy I came upon a magnificent specimen of *Ilex tolucana*, for I am an *Ilex* collector. It took me only a second to jump down the rocks, like a mountain goat, toward the tree. Our chauffeur Sr. Carrasco did not think

Gerald Davis, Sigmond L. Solymosy, and José Roldán-Parrodi on the Pedregal of San Angel.



too well of my goat-like abilities. He was afraid I had fallen and tried to rescue me with a long stick. When he found I was all right, he himself almost rolled down. He returned to safety and explained to Miss Bourchier the different sounds of the birds. He is quite an expert, and we enjoyed his ornithological knowledge.

While I was admiring *Ilex tolucana*, Phillip Clark and Gerald Davis followed the path up the cañon. I gathered specimens for the herbarium and climbed back to the road. I hardly had time to catch my breath, when a plant started rolling down the opposite side of the cañon. Who will follow, I asked myself? I did not have to wait long to see —Phil Clark came sliding and rolling down.

Clethra quercifolia, an evergreen relative of our native *Clethra alnifolia*, caught my attention. This large shrub or small tree was a faithful companion from past Ciudad Victoria to Jacala and again in the higher altitudes of the Valle de México. I collected herbarium specimens and seedlings. (Sadly the specimens did not survive.) Efforts should be made to introduce this clethra into cultivation; it takes heat, dry and wet conditions, and cold.

At twenty-five hundred meters (8,250 feet) the golden-yellow *Viola grahamii* was growing in dense shade under *Abies religiosa* in a black humus with a pH of 6.7. At 2,925 meters (9,650 feet), in black humus, we found a promising species of *Salvia* and almost in the roots of *Abies religiosa* the pretty *Chimaphila umbellata,* a semitrailing evergreen member of the *Pyrolaceae.* From twenty-five hundred meters (8,250 feet) upward we could see the dainty blossoms of *Fuchsia microphylla.* I had to be satisfied with a few herbarium specimens since fuchsias refuse to grow outdoors in our climate.

Dr. Solymosy examines *Coriaria thymifolia.*

Salvea fulgens.

At 2,925-3,000 meters (9,650-9,900 feet) the majestic *Furcraea bedinghausii* appeared. We doubted whether we should be able to get it. It was growing on the opposite side of the cañon, and we saw little possibility of collecting this plant without very strenuous rock-climbing. However, after walking a few hundred meters, we found *F. bedinghausii* far up on our side of the barranca. Gerald Davis, the youngest member of our party, volunteered to climb the wall, and after a while disappeared in the wilderness. José Roldán-Parrodi and I took a footpath that followed a strata line; we discussed weather, plants, and politics, and tried to figure out which one is more damaging to nature, man or goat. After a walk of half an hour, we looked to our right: there were furcraeas again within a hand's reach. We got our furcraeas, and they are now growing well in the University greenhouses.

At 2,600 meter (8,580 feet) we found the escoba or perlito (*Symphoricarpus microphyllus*). Escoba means broom and perlito little pearl. People use the branches to make brooms, and the shiny white fruit resembles a small pearl. At the same altitude we found *Dahlia variabilis* in bloom.

On July 4 we visited the Ciudad Univarsitario, the famous University of Mexico with its architecturally unique campus. I was much impressed by the mural mosaic on the library building, picturing the Aztec and the Spanish eras. I had the great pleasure of meeting Professor Dr. Maximino Martinez whose books I read. He very graciously gave me access to the herbarium and presented me with a copy of Dr. Ezio Matuda's book, *Las Amarilidáceas y Liliaceas del*

Gerald Davis collects seeds of *Bouvardia ternifolia*.

Valle de México y sus Alrededores. I also had the pleasure of meeting another well-known botanist, Dr. Faustino Miranda. One of the world's famous cactologists, Dr. Helia Bravo, showed me the greenhouses and the botanical garden. I have seen conservatories in different countries, but first place goes to the University of Mexico. Built or rather excavated in the lava with natural caves and grottos, topped by a tremendous glass cupola, and between the cupola and the circular "wall" a row of experimental greenhouses from which one looks down into a rain forest in its natural setting, this conservatory is unique.

Between and during showers, we also visited parts of the botanical garden and arboretum which, when finished, will equal or surpass Moctezuma's gardens. Dr. Bravo told me that some solution has to be found for handling the succulent collection; it suffers too much during the rainy season (May to August).

Our next field trip was to take us up to the Paso de Cortés — the pass on the saddle between the Popocatepetl and Ixtaccihuatl. But first we explored the rolling territory south of Amecameca. Between Tlalmanalco and Amecameca we found specimens of *Prunus capuli* (capulin) and *Crataegus mexicana*, (tejocote), nearby a carpet of *Erythrina leptorhiza* (colorin). The last is a herbaceous perennial with long flowers of a vivid orange. We gathered seed of *Prunus capuli* and seed and bulbs of *Zephyrantes* spp.

A little farther, about three kilometers west of Tlalamac, in a *Cupressus benthamii* barren, we saw the curious *Coriaria thymifolia* (tlacopertate). This shrub was collected by early Spanish botanists as a fern; its foliage truly resembles that of an *Adiantum.* José Roldán broke the silence while we were admiring the plant: "*Es una planta muy bonita de la familia de las Tlacopetlatlacaceae,*" he said. Thus we celebrated the birth of a new family, and I promised myself to test some of my fellow taxonomists for its correct place in the phylogenetic system. A promise I did not keep.

We turned around and headed toward the pass: ceiling twenty meters, (66 feet), clouds in blue coming down from the mountain as if Cortés — this time allied with Moctezuma — wanted to forbid us to go farther. We decided to proceed until we hit the thunder and rain, and then to turn quickly before the torrential mountain rain washed the road away.

While we were deliberating, an Indian woman came by; interested in plants, as all Indians are, she inquired about our doings. Miss Bourchier, knowing that she must have knowledge of medicinal plants, conversed with her. There is scarcely a plant this Indian woman does not know; she can also explain their medicinal uses.

At the beginning of our climb, at twenty-four hundred meters (7,920 feet), we found a relative of the "four o'clock," *Mirabilis longiflora*, with flowers three inches long.

As we continued climbing, so did the clouds. At 2,830 meters (9,340 feet) we encountered the grandfather of the Irish potato, *Solanum tuberosum. Abies religiosa* gives place to *Pinus hartwegii* around this altitude. At three thousand meters (9,900 feet) we came upon the dark purple *Penstemon campanulatus* with flowers the size of foxgloves, the plants from six to seven feet tall. They were a magnificent sight, indeed. *Ribes multiflorum, Lupinus elegans* (?), *Viola grahamii, Conopholis mexicana*, (the last an interesting member of the *Orobanchaceae*) are among the plants at this altitude.

Between 3,000 and 3,250 meters (9,900-10,700 feet) we found the beautiful *Salvia fulgens* with its velvety, brilliant red, inch-long flowers. Some of the plants were growing in such dark spots that I had to use a flashlight to photograph them. Finally we reached the pass just below the snow line: we admired the majestic peak of the Popocatepetl in the sunset, then reluctantly drove home. As we went down, the clouds again closed above us.

The next field trip took us south of the city of Mexico on a splendid July 8. The morning was cold, but we soon forgot physical hardships. Between Tlalpan and Tres Cumbres (Tres Marías) *Spiranthes aurantiaca* grows in profusion on rolling meadows. *Penstemon imberbis* grows under *Quercus fusiformis.* On the hillside *Dahlia variabilis* greeted us, and large clumps of a dwarf and prostrate *Lupinus* species formed a colorful carpet. At twenty-five hundred meters (8,250 feet) we found *Bomarea hirtella* (coyolxochitl) growing on shrubs. This is a vine belonging to the *Amaryllidaceae*; the flowers are pretty, but the real ornament is in the seed pods. We dug the tubers out of black humus (pH 6.5) from under and between heavy rocks. On a weedy slope *Pancratium harrissianium* (syn: *Hymenocallis harrissianum*) was in full bloom. It is a relative of our native spider-lily, but the foliage is of a better green, and the flowers larger, just surpassing the foliage.

At twenty-nine hundred meters (9,570 feet) in a very dark ravine the brilliant red *Crusea rubra* was flowering.

We crossed into the State of Morelos, south of Coajomulco, and reached the lava field of the Tepozteco. The plants grow there in a black humus layer with a pH of 6.2. This lava field is a paradise for plant hunters. One could spend a few years collecting in an area of not more than two thousand acres.

We collected seeds of *Sprekelia*, several unidentified terrestrial orchids, the poisonous and officinal *Asclepias linaria* (romerillo), *Oxalis deppei* and two other species of *Oxalis*, and an unidentified terrestrial red bromeliad. This

is the only location known for the small, nevertheless ferocious *Agave horrida.* Wherever one turns, the sharp spines find his shinbone. In a rock crevice *Maurandia purpusii* was bearing its large dark red flowers.

We spent the next few days in putting our notes, seeds, and plant-presses in order.

One night, my wife and I dined in the restaurant situated on the forty-third floor of the Torre Latino Americana. From our table, we gazed on the panorama of Mexico City. I felt remorse at being part of the twentieth-cenutury civilization, as I saw below the spendid Zocalo with its thousands of years of history, and in the far distance the dark mountain chain. No matter how far up I was sitting, I felt as though Moctezuma were looking *down* on me. The superb cuisine brought me back to reality, yet I still retained the feeling that I had intruded on the privacy of ancient history.

We left the city on July 11 for Valle de Bravo. Driving through the Desierto de los Leones—the desert of the lions, a beautiful dense forest at twenty-nine hundred meters (9,570 feet) — we found *Arctostaphylos arguta* in red clay with a pH of 6.0, and under it *Monotropa uniflora,* the Indian pipe, in bloom. In Louisiana *Monotropa uniflora* blooms in November and December; here at high altitude it blooms in July. We gathered an herbarium specimen of this peculiar plant, being very careful not to disturb the roots. *Salvia fulgens* was everywhere.

Thirty-eight kilometers (23 miles) west of Toluca we found *Cuphea aequipetala, Mimulus glabratus,* and *Fuchsia parviflora.* In a clearing an old, giant *Yucca australis* stands by itself. We estimated its age to be between two hundred and three hundred years.

About ten kilometers (6 miles) north of Valle de Bravo, at nineteen hundred meters (6,300 feet) in a *Quercus* barren we saw the scarlet *Dahlia coccinea* in full bloom, several members of the *Amaryllidaceae,* and a deep violet species of *Salvia.* We collected *Sprekelia* seed and *Bletia gracilis.* This is a small terrestrial orchid with irridescent leaves. The oaks here are covered with bromeliads; we collected one, a so far unidentified *Tillandsia* called pescarita by the local people. This epiphyte grew on a limb of an oak, inaccessible from the ground and so well anchored that it was impossible to move it with a long stick. The tree was brittle, and Gerald could not quite reach the plant. He took our machete and barely reached the base of the plant. After a few minutes the tillandsia budged, and I was ready to catch it as I stood beneath the tree. The pescarita tilted, tumbled while falling, and poured a gallon of water down my neck.

We drove another twenty kilometers and found *Stemmadenia bella* (lechoso), a shrubby member of the *Apocynaceae.* We collected specimens and cuttings, and I focused my camera to take a picture. To my great disappointment the roll fell out of the camera, unexposed! In my great excitement around the tillandsia and dahlia, I did not thread the film right. We could not return to photograph the dahlia, but I photographed the tillandsia on the ground.

Passing through Valle de Bravo, we paid a visit to Mrs. Olivia Converse. In her garden a splendid African legume, *Crotalaria agatifolia,* and a camellia were in bloom. She showed us some of her artistic botanical illustrations and paintings.

Darkness descended, as continued upwards and reached our quarters for the night. We enjoyed Miss Bourchier's hospitality in her brother's enchanting villa. It was cold: we sat around the fireplace, watching the burning logs and sipping tea fortified with the fermented and distilled juice of the sugar cane, otherwise known as rum. Everybody retired at an early hour after a plentiful meal. The balmy air, coming through the open windows, and the crackling of the burning wood in the fireplace soon lulled me to sleep.

The next morning we explored the cañon of the Santa Monica River. The cool rain forest with its slippery rocks and rotted plant debris made the descent hazardous. We were at an elevation of 1,875 meters (6,200 feet). The red clay base is covered by a rich humus layer with a pH of 6.2—in some places knee deep. The trees are covered with epiphytic ferns, *Phyllocactus,* and orchids. *Fuchsia fulgens* (flor de areite) was everywhere like a flaming torch. This tall shrub is about the most spectacular fuchsia. Two large rocks above the cascading Santa Monica stood guard like Scylla and Charybdis of ancient Italy. On top of one of them, seemingly growing out of the rocks, a big solitaire *Fuchsia fulgens.* The only way to take a picture was to climb Scylla and shoot at Charybdis. It was a risky enterprise, but it had to be done, so I climbed and shot. I did not share the fate of sailors of bygone days—Scylla and Charybdis were in a good mood.

It was of great interest to find that *Stanhopea oculata* grows on rocks. Some of the big boulders are literally

(Continued on page 190)

An unidentified species of *Tillandsia,* called pescarita by some of the natives in Mexico.

NEW ZEALAND REVISITED

By PIERRE DANSEREAU

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Continued from the July-August, 1962, issue

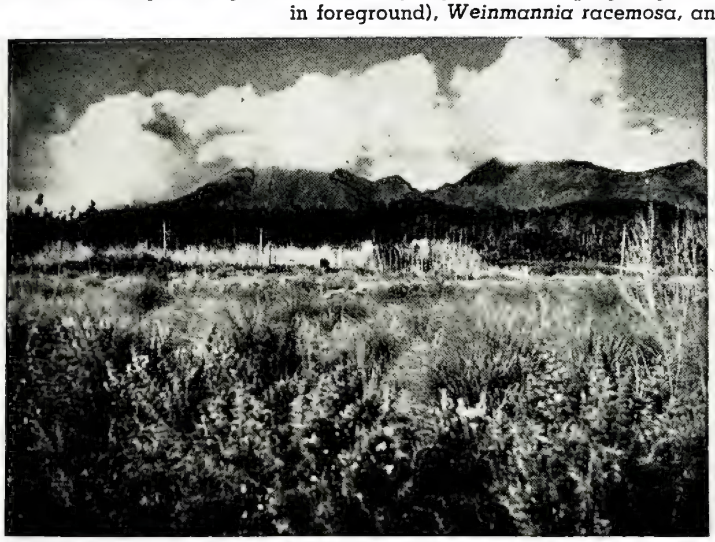
610527. HARI HARI—FRANZ JOSEF GLACIER —REEFTON

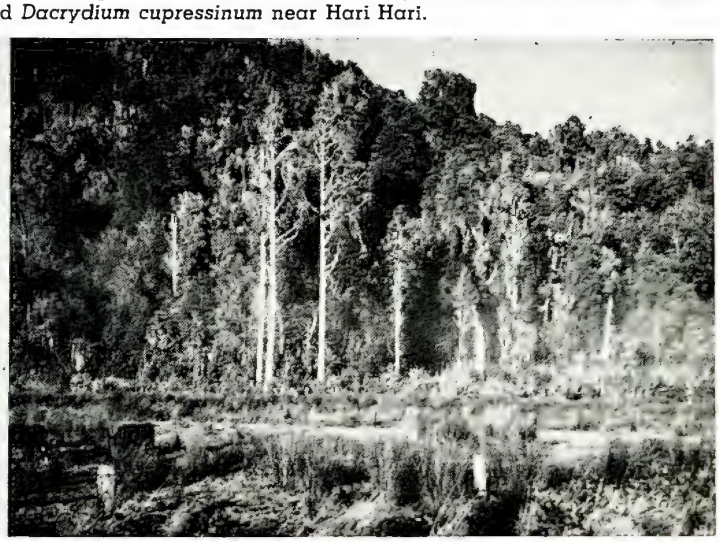
This has been a golden day. It started with a shimmering mist on the plain. Hoarfrost outlining every blade of green, and pewter dew on the shining coats of the Angus heifers. The high forest, however, untouched on the hills. The whole plain is pasture, good alluvial soil, with the weathered skeletons of "white pine" (*Podocarpus dacrydioides*) twisting in prayer against the dark blue hills and the gleaming snowy mountains. Extensive flax swamps, all broad blue daggers criss-crossing in geometrical patterns.

We skirt many mirror lakes, some with wisps of mist uncertainly hovering. Banks and cliffs with a thick tapestry of *Blechnum procerum*. Forest, forest, beautiful podocarp forest, with a wealth of tree ferns. And on to the Franz Josef Glacier. The recession of ice here has been spectacular. We park our cars on a spot which was under ice a very few years ago. From the foot of the glacier (not limpid green ice except in the recent cracks, but ice with a dirty chocolate icing) downward on the recent moraines and the outwash gravel, a vast emptiness of stone and silt, a vast sterility through which the stream is cutting new channels. A recent terrace has tufts of blood-red *Epilobium*, green patches of fruiting *Poa novae-zealandiae*, and small silver-gray carpets of *Raoulia tenuicaulis*. These populations are precarious. I find them again on moraines which are at least ten years old. This, apparently, is just about the time for the first coriarias to come in. *Coriaria arborea* (such a dark green!) has root nodules and must accelerate the colonization process like alder does. Where microrelief is somewhat concave (small depressions or corridors on the humping surface of the coalescent moraines), mosses come in and offer a good mat for the germination of woody plants (*Hebe subalpina, Olearia avicenniaefolia, Carmichaelia grandiflora*). These same shrubs form a dense belt in the area just above. In fact, here as on the margin of the Hooker glacier, one has the impression of missing stages in succession, with early pioneer vegetation well-developed, consolidation stages well-stabilized, and late pioneer stages wiped out by intermediate retrogressions. At all events the wasting of ice has been extremely rapid in this particular area. Philipson has photos taken only a few years ago that show the ice-lobe encased in this low valley. Several aspects are seen, as we leave the Glacier area: low *Coriaria* scrub; open *Coriaria-Carmichaelia* with much bryophyte matting; taller very dense scrub (to 5 meters) of *Olearia ilicifolia-Coprosma rugosa; Metrosideros* scrub (? 8 meters !) quite closed; *Weinmannia-Cyathea* mesophytic forest.

Near Lake Ianthe we spend awhile in one of the most impressive forests I have yet seen. All the tallest trees (40 meters) are podocarps (*Dacrydium cupressinum, Podocarpus ferrugineus, Podocarpus dacrydioides*), the rimu quite strongly buttressed. *Quintinia* and *Weinmannia* very abundant and regenerating vigorously. A good layer of tree ferns (*Dicksonia*) and quite a development of araliads. Epiphytes, mosses, although not in a heavy carpet either on trunks or on ground. Some of these forests are encumbered with lianas (*Freycinetia banksii* and *Rhipogonum scandens*): this jungle-like effect is not without cause (lumbering mostly or felling of trees anyway). The tree ferns prosper under a more open canopy and develop a continuous dais, but the *Fuchsia* and *Aristotelia* also! Philipson, Wardle, Burrows, and I are so enthusiastic about this rich forest that it takes the dusk, effacing the hollows into which we step and confusing the perspective of the interlacing vines, to chase us out of it. It is now damp and cold. The ash-pink sky has no gleam between the drooping rimu branchlets and the precise oval of the quintinia leaves. The perched astelia is a forbidding rosette. Nearer at hand, the touch of the filmy ferns is so light as to seem unreal,

Left. *Gahnia* peat bog at Kumara; *Leptospermum* is dying. Right. Dense temperate rain forest of *Podocarpus dacrydioides* (tallest trees in foreground), *Weinmannia racemosa*, and *Dacrydium cupressinum* near Hari Hari.





Typical Westland lake with its dense temperate rain forest of broad-leaved and podocarp trees and its hovering mists.

whereas the moss underfoot is resilient, occasionally crumbling where it overlies a rotting log.

We trip our way back to the road, now almost dark, and shivering re-enter the well-heated car. In Hokitika we join the rest of the party. Françoise is in a vast Catholic church, incongruously Italian in this misty dusk. We drive on to Greymouth. (Eric has telephoned Reefton and advised that we shall not have dinner at the hotel where we are booked! may we be pardoned?) Dinner in a dive-like fish-and-chips joint. Cold in there too, and not too engaging. But fish, chips, and oysters are delicious.

And on to Reefton in the night. Twists and turns, as Eric drives the landrover, and its highlights pick out a tree, a fence, a house. At the Reefton Hotel we are greeted most leisurely by an egregious lady who expresses herself with great care, detaching each syllable as though she were going to spit pearls. Our room is very small and very cold. The lady :"I am bring-ing gyou a hot-tie (hot water "bottle" (= bag)), I ykno-ow yyou wwill wwant tit. Tit-tis ra-ther rcauld dto-niight. . . ." We take refuge in the bar (illegally open at this time of night, 8-10 o'clock) and sip our drinks to the background of much local banter. (One rather fat, sly-looking, middle-aged woman is unreluctantly slapped on the backside by a very winy contemporary.) But we belatedly discover a sitting-room with a good blaze in it, and Philipson, Wardle, Atkinson, Burrows, McCaskill, and I continue the session there—until quite late. Controversy on climax, on mapping, on objective records, and interpretations. Ian poses candid and critical questions. Peter utters thoughtful doubts.

610528. REEFTON—CHRISTCHURCH

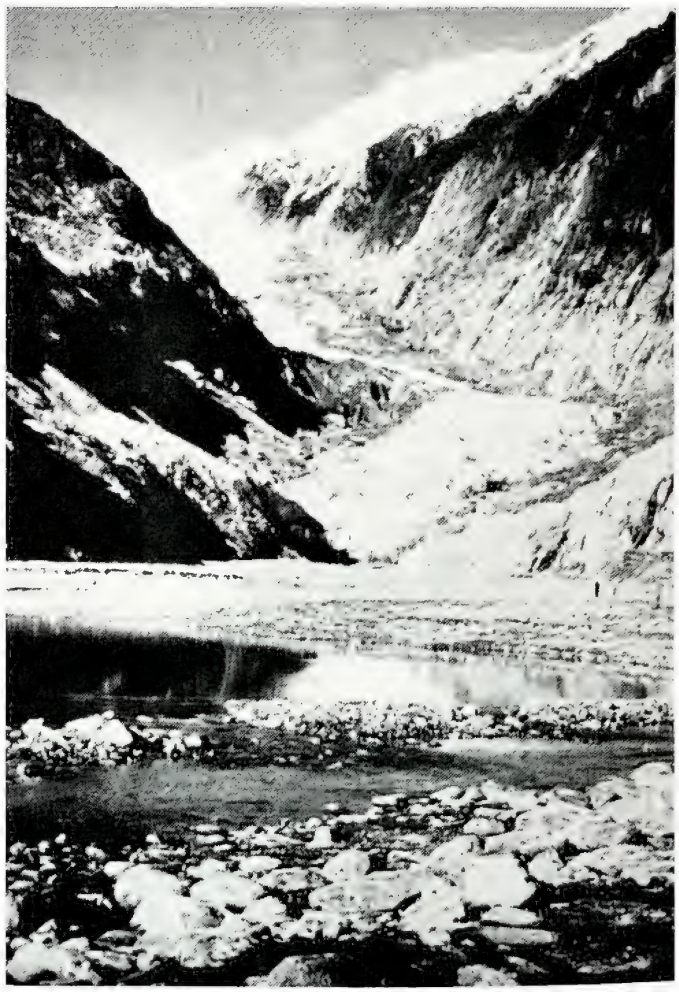
On Sunday, morning tea is late and breakfast later, so there is plenty of time for shivering and stuttering until a pretty but lackadaisical and rather clumsy girl finally offers the ritual cup. Some of us sit and stand before the fire, rather twisting to roast one joint while the other ham cools. Breakfast room otherwise congenial, with many bouquets of chrysanthemum on old-fashioned doilyed buffets, and immaculate curtains coyly framing the windows. Breakfast, when it comes and we are all assembled, quite good.

The lady-at-the-desk needs little encouragement to pursue a monologue on the unhealthiness of "Ker-i-tschurchsuch cha tay-rribble cullim-ate so ffoggy. . . ." And dripping dew it is in Reefton outside, and dripping in the beech forests where we stop on the way up to Lewis Pass. We make several stops in beech and podocarp forests, starting at about 1,000 feet with a tall red-beech forest of a lowland type, which prevails well above 1,500 feet to a predominantly mountain-beech forest (at 2,000 feet) with montane elements such as *Libocedrus bidwillii* and subalpine ones (*Pittosporum crassicaule, Coprosma pseudocuneata, Phyllocladus alpinus, Archeria traversii*). A little higher a very curious bog with a matrix of *Hypolaena* growing through abundant and cushiony sphagnum and with scattered *Dacrydium bidwillii* and *Dracophyllum palustre.*

After a fairly good lunch at a roadside "general store," we plunge eastward and downward, in a ray of sunlight and into clearer and drier air. On an open talus an assortment of curious spiny, twiggy, leptophyll xerophytes growing all over each other in a messy tangle: *Clematis afoliata, Rubus squarrosus, Sophora prostrata, Muehlenbeckia complexa, Rosa eglanteria, Ulex europaeus.* Back in the grassland, the blond fescue and scattered *Sophora* bushes.

It is dark when we reach Christchurch. Too late for dinner at the United Service Hotel. We have a delightful room, well-heated, an excellent shower. Dinner in a pseudo-Chinese restaurant.

A receding lobe of the Franz Josef glacier.



Left. Craigieburne Mountains at Allan's Basin. *Dracophyllum-Podocarpus* scrub above the mountain-beech forest (*Nothofagus cliffortioides*). Right. Timberline on Mt. Wall with low forest of mountain-beech followed by a scrub of *Podocarpus nivalis* and *Dracophyllum uniflorum*.

610529. CHRISTCHURCH

The beginning of what promises to be an extra busy week. An upset at breakfast! We walk into a very large dining room with twenty-five to thirty tables all set with seven knives and seven forks, cardboard-stiff mitre-like napkins, beautiful flower arrangements, waitresses dressed like nurses. Are ceremoniously led to a table for four. Half of our breakfast in peace. And then, in this empty dining room, with twenty-five free tables, the headwaitress seats an unknown man with us. Françoise is very sweet and talks to the unknown, a pleasant enough traveling salesman type. Exchange of weather reports and where-do-you-come-froms. I rather heatedly protest at the "desk"—whose business it is not. At noon we get a table for two and cold stares, and cold shoulders, and a general slowing down of service.

Botany Department more like an old coin than a new penny. Philipson's office quite congenial. All staff assembled for morning tea below-stairs in a sort of recess. Latest recruit is Brian Fineran, a bony young man who has spent a season on Snares Islands. I walk about campus among students with long red and yellow scarves twisted around their necks. I seek out the (acting) head of geography, ask a student in the corridor where is Dr. Johnston's office, am told that *Mr.* Johnston's office is first left down the hall. (Maybe titles are harder to earn in New Zealand, and maybe they mean more, too!)

610530

Morning tea with the new Vice-Chancellor, L. L. Pownall, erstwhile head of geography, a very well-spoken gentleman who asks my opinion on television and the university. This I brashly provide in no uncertain terms, and they pretend not to be at all amazed. I am thanked and complimented and dispatched within the half-hour.

Early afternoon, lecture in French to students (and several staff members, including Prof. Sussex) on the cultural development of the two Canadas. This is followed by a round-table. Some New Zealand students have had a season in New Caledonia, have acquired an excellent French accent. My exposé strictly news to all: no idea that French and English in Canada do not live in the best of harmony. I make comparison of decolonization processes in Canada and New Zealand, as illustrated by literature and painting.

In evening, lecture on arctic and alpine vegetation with only a very few slides. Un tour de force again? A very good audience, what with D.S.I.R. people present: Eric Godley, Peter Wardle, Lucy Moore, Henry Connor.

610531. CHRISTCHURCH—CRAIGIEBURN FOREST

Philipson, Burrows, and I meet Jack Holloway and his wife at a crossroads and drive up to Porter's Pass and Craigieburn Forest. I ride in the front seat of the Holloway's car with them. Last time I saw her, she was just coming out of the hospital, and we drove her home: I carried baby Barbara in my arms. Una Holloway quite as young and vivacious as she was then. Much like my sister Aline: an impulsive manner, a clear complexion, an appealing smile, and seven children! Devotes much time and attention to husband, who is somewhat deafer than I am in spite of his hearing aid. Hovers over the conversation, very quick to detect a quiproquo and tactfully backtrack the conversation to the side-tracking point.

Forest hut at the foot of the beech-forest area. Two burly young men working in nursery. Cold, bright day. Sunlight on the snow-laden boughs of the black-leaved mountain beech. Landrover, driven by a young forester with a bursting peal of laughter, climbs precariously on iced road up to timberline. Sunlight intermittent now. Variants of forest: at low levels good reproduction. Near top none, for the deer take all. We walk up into the snow tussock, the big russet and silver-green tufts very evenly spaced, their plumose heads waving. Snow thick on the ground.

A great pleasure to see Holloway again after all these years. He has aged somewhat; his ruddy, cheerful face with fine creases, his blond hair still thick, and his eyes sharp and piercing. Like many deaf people, inclined to the somewhat preclusive monologue. But communication between us (dialogue de sourds? non!) very good after awhile and thanks to Una. Holloway has had much influence in New Zealand on ecological theory. His 1954 paper[5] is a landmark. His theory of the continuing change of forest composition and the non-stable state of present areas is widely accepted. Moreover, young men like Peter Wardle have

worked and been trained under him. He has driven them quite hard, I understand, and they have loved it and loved him for it. It could be, however, that they take his ideas more seriously (or consider them more final?) than J. H. does himself.

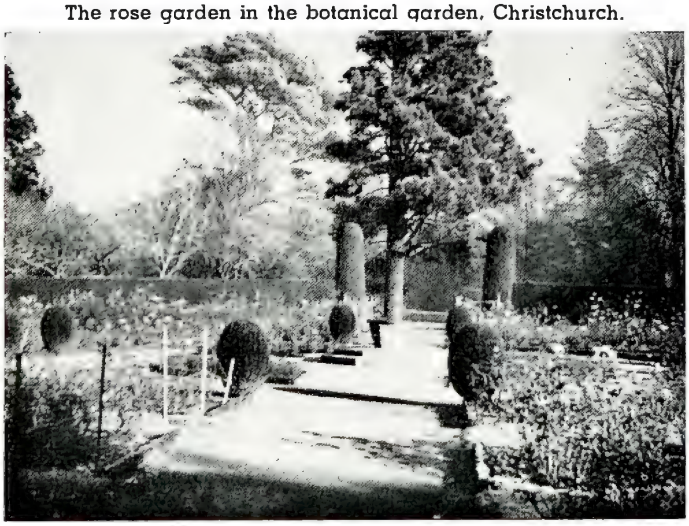
Evening at Philipson's. We meet Dr. Mayer, who teaches ecology. She once worked with Braun-Blanquet. She is a plump, middle-aged German refugee, a generous-minded person, a bit erratic, and very nice. Also, Dr. R. H. Langer who teaches botany at Lincoln College. Philipson shows us very good pictures of New Zealand vegetation, especially alpine. (He is preparing a book on this subject.) Mrs. Philipson, typical New Zealand matron, has prepared elaborate and abundant supper. This is the best of New Zealand cuisine.

610601. CHRISTCHURCH—LINCOLN

A day in the Botany Division of D.S.I.R. at Lincoln. Eric Godley drives me out in the morning. A series of very new and functionally designed buildings: herbarium, library, laboratories. A considerable staff, quite diversified. On the whole, better quality and quantity in every respect than any single New Zealand university botany department. Good interviews with Fisher, Hair, and Lucy Moore. Fisher's study of hybrid *Ranunculi* and his explanations excellent. Some of these alpine hybrids very reminiscent of the *glacialis* x *alpestris* hybrids I had seen with R. Chopinet in 1938. (I gave Fisher Chopinet's address.) Hair's working-out of *Podocarpus* phylogeny through chromosome-mapping very exciting, indeed. Maybe a clue to past migrations. I must obtain seeds of Central American species. Lucy Moore somewhat reminds me of our own wonderful Lucy Braun: although they are hardly alike in stature or complexion, they both have shown an impressive determination to develop new ideas and to fight for them.

Eric and I have lunch in the local inn, in a small room at same table with other guests. Simple fare of meat, potatoes, and bread (with jam for dessert). Then a visit to Langer at Lincoln College. I remember the buildings from 1949, and also Mr. Iverson with whom we visit the greenhouses. We are shown an interesting machine which determines leaf area directly. This could very well be used in Raunkiaurean studies, although it is designed for the estimation of productivity.

The rose garden in the botanical garden, Christchurch.



Colin Burrows in an alpine prairie of snow-tussock (*Danthonia flavescens*).

I give a carefully prepared talk on introgression to what is probably the most highly qualified audience I shall have in New Zealand. I have spent more than an hour making drawings on the board. But that talk is not nearly so good as the same one given in the evening to Botany and Geography Departments audience, without previous drawings and without slides. Can you bear it? They did, they had to. But I am amazed.

610602

Yesterday was full. Et aujourd'hui donc! Discussions all morning on mapping with Johnston, McCaskill, and a young man who hopes to specialize in biogeography, Peter Holland. He and his students have already done very nice work in the field. Their maps are on exhibit in the classroom.

At morning tea, meeting with Dr. Maxwell Gage, glacial geologist who takes me to the Geological Survey to see Dr. Suggate. It is brought home to me what a busy period the Pleistocene was in New Zealand: mountain-building and coastal movements altogether as important and influential as glaciation itself.

Geography seminar on the principles and techniques of mapping. The Toulouse symposium discussion presented in perspective and an exposé of what to map and how.[6] A good audience, but unfortunately no time for questions. I am drawn more and more to the conclusion that American students are the best in this respect. They do not fear to ask questions. They are not so willingly *told*.

Evening quite the most heart-warming we have had away from home. Jack Holloway calls for us at the hotel and drives us to his home in Rangiora. Twists and turns in the cold starlight, rush through towns, and silent plunges into side roads. And then the house, a low structure with a banging gate, an uneven walk in the dark, a brush against bushes. The opening door reveals Una in slacks and heavy-knit sweater. Come in, come in. An old oak chest bars half of the hall. The open bathroom door shows Philip, naked, drying himself in the steamy draft. Barbara (my Barbara), twelve years old, fair-haired, clear-eyed, receives the "Queen Anne" chocolates with a shout: "Oh! They are Mummy's

favourites!" The next hour is spent in a small sitting-room by a glowing fire. Well-worn chintz or tapestry armchairs, books, papers, various family souvenirs, a warm and pleasantly arrayed disorder. Baby Mary, plump, rose, and blue, clutches at father. Margaret, a ten-year-old beauty with violet eyes, questions silently. Barbara dances for us in bare feet. Philip now clad in dressing-gown, brushed, and scented with soap, sits familiarly on my knee, and we talk very grown-up. Presently Bill comes in, his bare legs caked with mud, fresh from football, breathing and sniffing loudly. He is sent off to bathe. Jack offers us sherry and whiskey and goes off to tidy up. And while Una is in the kitchen, tall, lanky, timid Tony comes in. But most of the entertaining is done by Bill (now a shining pink, his blond hair wet and brushed), whose voice has husky undertones. No doubt about Bill's future at all: he will be an author. (He is said to have written a number of blood-curdling tales already.)

Dinner in the big kitchen-dining room, at the long table, with Tony participating. Excellent lamb. Wine and good humor. Barbara, Margaret, and Bill are allowed to have dessert (a good deal of) with us. Evening by the fire and earnest, searching conversation on education, religion, politics. (Thank you, Jack and Una. With you an act of faith is possible. And maybe I shall dream that I am as hopeful as Bill and trying out my voice and my muscles and that I shall write things which other people will read.)

610602. CHRISTCHURCH—DUNEDIN

A day in the train, brightness once more on the landscape. And all those stops. We have aboard a large group of young men wearing sports sweaters and black bowler hats who call themselves the Presbyterian Harriers. (Qu'est-ce que c'est que ça? des coureurs! oui, des coureurs à pieds!)

To be continued

5. See footnote 2, July-August, 1962, p. 147.

6. Pierre Dansereau. Essai de représentation cartographique des éléments structuraux de la végétation.—IN: "Méthodes de la Cartographie de la Végétation," Colloques Internationaux du Centre National de la Recherche Scientifique, Paris, 97:233-255. 1961.

BOTANY AT THE UNIVERSITY OF MICHIGAN

By WILLIAM CAMPBELL STEERE

From the address that Dr. Steere, Director of The New York Botanical Garden, delivered at the dedication of the Botanical Garden at the University of Michigan on June 14, 1961. Shortly after delivering this address, Dr. and Mrs. Steere departed for a five-week field trip in Greenland, under a grant from the Arctic Institute of North America.

THE DEDICATION of this magnificent new botanical garden, made possible by the generosity of Regent Matthaei, marks still another milestone of progress for botany, not only at the University of Michigan, but for the whole country as well.

The idea of a botanical garden associated with the University has been a venerable one, indeed. In 1817, the bill that established the first university in Detroit—the Catholepistemiad—gave the governing board authority to establish a variety of institutions, including botanic gardens. The University at Ann Arbor began in 1837 with the first meeting of the Board of Regents. Very shortly afterward, in 1838, the brilliant young botanist Asa Gray, who was induced to accept the first professorship, visited Ann Arbor and "contrived a plan for the arrangement of the grounds which gives satisfaction to the members of the board here, and . . . will suit all." From Gray's own interests and from the custom of the times, we may be reasonably sure that he included a botanical garden in his plan, even though the contemporary map seems to have disapperaed. However, the University did not open its doors on schedule, and after waiting several years in vain for his teaching duties to begin, Gray accepted a position at Harvard, where in a long and successful career he became the top American botanist of his day—and did establish a botanical garden. As a consequence, botany at Michigan suffered an eclipse which lasted for many decades, and the botanical garden on the campus as originally proposed never materialized.

As Dr. J. O. Schlotterbeck succinctly stated the case:

"The first attempt to establish a botanical garden at the University was made principally upon paper, for on one of the earliest maps of the village of Ann Arbor the greatest part of the eastern half of the campus was designated as the Botanic Garden. Some of the old settlers state that this so-called garden never passed the stage of a corn-field, while none of them can recall that it possessed the beauty of a well-kept gardon spot."

In spite of the University's official recognition of its need for a botanical garden, through the years, other needs had higher priorities, and so this one continued to remain unattended until the turn of the century. Professor V. M. Spalding of the Department of Botany and Dr. Julius O. Schlotterbeck of the Pharmacy Department rejuvenated the idea of a botanical garden in the late 1890's and grew many plants for instruction and demonstration on the campus itself. The campus garden was recognized as a makeshift from the beginning, and as the campus became more crowded, space became more inadequate. From 1908 until 1914, the work of the botanical garden was carried on in what is now the Nichols Arboretum, along the Huron River. In 1915, with Dr. H. A. Gleason as director, the University of Michigan's first botanical garden that really merited the name opened on a tract of land just off Packard Road. When Dr. Gleason left Michigan in 1919 to become Curator at The New York Botanical Garden, he was succeeded as director by Professor H. H. Bartlett, under whose leadership a strong program in experimental botany developed.

Between 1919 and 1940 the Botanical Garden of the University of Michigan on the Packard Road site was one of the leading facilities of its kind among the universities of this country for the professional training of graduate students and for the continuing research of staff members. Probably no educational institution in the United States could match during those years the diversity or the inten-

sity of the active investigations of the taxonomy, cytotaxonomy, and cytogenetics of living plants collected—or crosses produced—specifically for such studies. Graduate students were vigorously encouraged to bring together collections of living plants, both outdoors and under glass, for their doctoral work, and post-doctoral researchers were offered the facilities of the garden for their investigations. Those were years of intensive research on *Oenothera* by H. H. Bartlett, B. M. Davis, Frieda Cobb Blanchard, Sterling Emerson, and others; on *Rosa* by Eileen Erlanson McFarlane; on *Zea mays* by E. G. Anderson and Marcus Rhoades; on *Petunia, Salpiglossis,* and *Capsicum* by E. E. Dale; on *Solanum, Nicandra,* and other genera by Janaki-Anmal; on *Ambrosia* by K. L. Jones; on *Cactaceae* by Elzade U. Clover; on *Petunia* by Steere. I grew up near the former site of the Botanical Garden and spent much time there during my formative years. It was no accident, then, that I used its facilities to grow the plants for my own doctoral thesis and that I eventually became a member of its staff.

In addition to the researches in taxonomy, cytology, and genetics primarily sponsored by H. H. Bartlett, other and diverse fields were accommodated at the garden. F. G. Gustafson grew enormous numbers of plants for his research, especially on the physiology of tomatoes; C. D. LaRue used the collections under glass as the source of experimental material for his investigations of plant morphogenesis; and E. B. Mains and his students grew extensive cultures of stocks and other plants to test physiologic strains and races of mildews.

After the great depression and World War II, which reduced its financial support and thereby also its activities, the Botanical Garden never regained its earlier momentum.

I envy Dr. Norman the special kind of botanical garden that he can develop on the land about us here. He can—and should—emphasize graduate-student training and research, as well as faculty research, with living plants, without having to serve also as a public park, recreational area, or combined camp and picnic ground. This is the great advantage of a university botanical garden. It can decide completely what its clientele shall be, and admit only those persons or groups interested or willing to be interested in plants.

The overwhelming problem of the great municipal or royal botanical gardens, as The New York Botanical Garden and Kew, is that they serve as public parks even though their primary purpose is basic research on plants. I hope that this very real difference between a university botanical garden and the more traditional type is not lost sight of here.

In this beautiful site, the new Botanical Garden of the University of Michigan, under the leadership of a distinguished director with broad interests and experience in the plant sciences has an unlimited future as a national center of botanical research and education. The botanical world owes a debt of gratitude to the University officers whose wise judgment led them to the painful decision to abandon an already developed, although inadequate site and to establish this brand new one. As one who has watched these events with enormous interest, I offer my own personal congratulations as well as best wishes for a full measure of success for this great venture.

MEXICO (Continued from page 184)

covered by them. A few grow on trees, but these seem to be the exceptions. I peeled off a small one, fastened it to a rock, and today it is thriving well in the orchid house at the University of Southwestern Louisiana. Some may ask why only one and a small one at that? It is easy to destroy in a few years, through reckless collecting, what nature took centuries to develop. I have seen sad examples of plant exploitation in different parts of the world, but no one in our party wanted to damage the magnificent plant association of this wilderness.

In the afternoon we continued west and downward. It became warmer, a hot breeze blew from the tierra caliente, and we had to remove some of our protective clothing. Soon a drizzling warm rain began to fall, reminding us of Louisiana, and we worked steaming under our rain gear. At the western foothills of the volcano Zinantecatl, at the westernmost tip of Lake Tilostoc, we found *Milla biflora*, a yellow tigridia, and a dahlia, probably *Dahlia coccinea.* Here we also collected *Sprekelia* seeds.

After a few kilometers and a few hairpin curves, twelve kilometers (7.5 miles) west of Toluca, north of Tlalzilalcalpan, the wind suddenly changed to icy cold. On a high bluff of yellow clay (pH 5.9) under *Agave atrovirens,* huge bushes of *Salvia microphylla* were blooming, with a tall red *Penstemon* species.

Mexico, contrary to sensation-hunting newspapers and magazines, is a thriving and hard-working country. The economy is stable and wisely supervised by the government. Mexico has a strong middle-class. The living standard is constantly increasing. Even small hamlets, consisting of a few houses, have schools. While I was there, I read in a magazine from the United States about the trouble during the regional elections in a certain part of the country. It so happened that a few days before—during election day—I drove through the outskirts of Mexico City and passed near several election places; I drove through and stopped in several small towns and villages while the voting was going on. Everything was quiet and orderly. The people are friendly and very polite, their knowledge of nature is remarkable. They have every reason to be proud.

I cannot find words to express adequately my gratitude to my distinguished colleagues, friends, and acquaintances for their truly unselfish help. I can hardly wait for the day to come when I shall return to that magnificent country, its friendly people, its fascinating flora.

BOOK ORDERS

Books reviewed in *The Garden Journal* or any other book on botany, horticulture, nature study, conservation, flower arranging, or kindred subjects may be ordered through Book Service.

Members are entitled to 10% discount on the list price.

When you place an order for books, please send check or money order, made out to The New York Botanical Garden, to Book Service.

STRAWBERRIES (Continued from page 175)

The strawberry clipper, a small weevil, may cause damage by cutting the tender flower stems just as the first buds appear. Two applications of DDT, thirty pounds of five per cent dust to the acre, the first when the buds appear and the second when the fruit crown begins to open, should control this insect.

Reading about these hazards to strawberries may tend to discourage one from growing them, but the chances are that the home gardener will not have to contend with all these pests. With healthy, virous-free stock in rich plant beds not recently planted to berries, most of these troubles may be avoided. I have discussed them to point the way to the control of some of the difficulties one may encounter.

The selection of varieties depends on the purpose for which they are grown: for earliest commercial use, "Premier', 'Blakemore', and 'Tenn. Shipper' and for the garden 'Fairfax', 'Midland', and 'Dorsett' are desirable. For midseason 'Catskill' and 'Pocahontas' are commercial leaders; 'Catskill', 'Midway', and 'Empire' are varieties for quality. Late bearers are 'Robinson', 'Jerseybelle', 'Tennessee Beauty' and 'Sparkle'; 'Redstar' is very late. Of course, there are other good varieties for shipping and for dessert. These are just my suggestions.

BOOKLETS

Catalog of Hardy Trees and Shrubs, a list of the woody plants grown outdoors at the Garden in 1942. Illus. Price 75¢ per copy.

Hardy Ferns and Their Culture. Illus. Price 25¢ per copy.

Flora of the Unicorn Tapestries. Illus. Price 25¢ per copy.

Food and Drug Plants of the North American Indians. Price 25¢ per copy.

Montgomery Conifer Collection, non-technical descriptions of conifers with information on history, habitat, and usage. Illus. Price 50¢ per copy.

Plants of the Holy Scriptures. Price 25¢ per copy.

Succulent Plants of New and Old World Deserts. Illus. Price 50¢ per copy.

Also reprints of well-illustrated, step-by-step articles on different garden techniques, written and photographed by T. H. Everett, Assistant Director (Horticulture): "Lawn Verges," "How to Force Dutch Bulbs" (in the home), "Some Sources of Humus," "Tree Pruning Pointers," "Sowing Seeds in Flats," "How to Transplant," "Some Fall Gardening Work" (i.e. heeling in, root cuttings, bulbs in pebbles), "Winter Protection of Plants."

10¢ each — any 6 reprints 50¢

The above booklets and reprints are obtainable from The New York Botanical Garden

THE NEW YORK BOTANICAL GARDEN
BRONX PARK NEW YORK 58, N. Y.

All back issues and reprints of back issues of *Addisonia, Brittonia, Economic Botany, Memoirs of The New York Botanical Garden, Mycologia, and North American Flora* are handled exclusively by Stechert-Hafner, 31 East 10th St., New York 3, N. Y. All inquiries should be addressed to that company.

Stechert-Hafner also sells the following books published for The New York Botanical Garden at these list prices:

Britton: *Flora of Bermuda*		$10.00
Gleason: *Plants of the Vicinity of New York*		4.50
Gleason and Collaborators: *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada**	3 vols.	35.00
*Family Keys from New Britton and Brown Flora**		1.00
Hagelstein: *The Mycetozoa*		7.50
Mackenzie: *North American Cariceae*	2 vols.	20.00
Keys to the North American Species of Carex		1.65
Rydberg: *Flora of the Prairies and Plains of Central America* (stained copies)		4.25
Van Melle: *Review of Juniperus Chinensis et al*		1.50

*This work may also be purchased from The New York Botanical Garden. There is a handling charge of $1.00 on The New Britton and Brown Flora.

Subscriptions to the following periodicals should be sent to The New York Botanical Garden.

Addisonia, colored plates of flowering plants accompanied by non-technical descriptions; 8 plates to a part, 4 parts to a volume. Published one part annually. Free to members of the Garden; $10.00 per volume to others.

Brittonia, published quarterly for the American Society of Plant Taxonomists. Subscription included in the Society's dues $6.50 a year. $7.50 per volume to others.

Economic Botany, official organ of the Society of Economic Botany, published quarterly. Members' subscription included in Society's dues $7.50 a year. Subscription to non-members $8.00 a year.

Memoirs of the New York Botanical Garden, scientific papers by members of the staff and collaborators; issued irregularly. Vol. 10, $10.00. Prices of earlier volumes on request.

Mycologia, official organ of the Mycological Society of America, published bi-monthly. Members' subscription included in Society's dues $8.00 a year. Subscription to non-members $10.00 a year.

North American Flora, descriptions of the wild plants of North America, including Greenland, the West Indies, and Central America. 100 parts issued; now in 2nd series. Prices of parts on request.

The Garden Journal, non-technical articles on botanical, horticultural, and kindred subjects, published bi-monthly. Free to members of the Garden. Subscription $3.00 a year (foreign $3.50) to others.

Back issues of The Garden Journal, 75¢ each, and of The Journal of The New York Botanical Garden, 50¢ each, are available from The Garden.

THE NEW YORK BOTANICAL GARDEN
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BRIEF NOTES ON RECENT BOOKS

By ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

REGIONAL BOOKS

CITRUS GROWING IN FLORIDA. Ziegler, Louis W., and Herbert S. Wolfe. 248 pages, illustrated, indexed. University of Florida Press, Gainesville, 1961. $6.00.

The authors state that they have had the home gardener in mind while writing this book on the history and culture of citrus fruits in Florida. They offer a well-organized, comprehensive guide which should prove invaluable to amateur as well as to professional growers.

DRAWINGS OF BRITISH PLANTS: BEING ILLUSTRATIONS OF THE SPECIES OF FLOWERING PLANTS GROWING NATURALLY IN THE BRITISH ISLES. Ross-Craig, Stella. Part XVII: Compositae (3). 36 plates, indexed. G. Bell and Sons, Ltd., London. 1962. Paper, $1.50.

Includes the following genera: *Carlina, Arctium, Carduus, Cirsium. Onopordum, Saussurea, Serratula, Centaurea, Cichorium, Arnoseris, Lapsana, Picris, and Crepis.*

THE GRASSLAND OF NORTH AMERICA; PROLEGOMENA TO ITS HISTORY, WITH ADDENDA. Malin, James C. 486 pages, bibliography. Published by the author, Lawrence, Kansas. 1961. Paper, $4.00.

The fourth printing of an exhaustive study of the Trans-Mississippi West prairies, which was originally published in 1947, with a new chapter "On the Nature of the History of Geographical Area, with Special Reference to the Western U. S."

HARMFUL AQUATIC PLANTS IN AFRICA AND MADAGASCAR. Wild, Hiram. (Science Council for Africa South of the Sahara. Pub. No. 73) 68 pages, illustrated, bibliography, indexed. Inter. Publications Service., New York. 1962. Paper, $3.75.

An excellent pamphlet containing descriptions and clear drawings of over fifty plants which are troublesome or present potential danger in the waters of Zanzibar, Madagascar, Mauritius, and Seychelles. Control measures are given whenever information has been available.

WINTER TWIGS: A WINTERTIME KEY TO DECIDUOUS TREES AND SHRUBS OF NORTHWESTERN OREGON AND WESTERN WASHINGTON. Gilkey, Helen M. and Patricia L. Packard. 109 pages, illustrated, indexed. Oregon State University Press, Corvallis. 1962. Paper, $2.50; cloth, $3.50.

A fine identification guide written by eminent authorities of the Pacific Northwest flora. This key is based on winter characters and has been illustrated by the authors with meticulously rendered line drawings of winter buds, leaf and bundle scars, and piths in cross section.

BIOGRAPHY, TRAVEL AND HISTORY

EARLY MAN IN THE NEW WORLD, rev. ed. Macgowan, Kenneth and Joseph A. Hester, Jr. 333 pages, illustrated, bibliography, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1962. Paper $1.45.

Important archeological techniques have been perfected in the twelve years since the senior author's book first appeared. The dating of woods and bones through radio-carbon is one of the outstanding examples of recent investigations. Much of the correlating and revising of the original work has been done by the present co-author, Professor Hester of the Department of Sociology and Anthropology at San Jose State College, California.

GRAND CANYON. Krutch, Joseph Wood. 252 pages, illustrated, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.25.

For those who love colorful, descriptive writing. Mr. Krutch shares with the reader his vast store of knowledge of the geology, biology, and history of the Canyon.

HER GARDEN WAS HER DELIGHT. Hollingsworth, Buckner. 166 pages, bibliography. The Macmillan Co., New York. 1962. $4.00.

The author of *Flower Chronicles* (1958) has delved again into botanical and horticultural history. In the present volume she offers delightful biographical vignettes of a score of women gardeners and botanists, most of whom are American. The bibliography reflects her untiring efforts in searching for authoritative source material.

THE LAND OF LITTLE RAIN. Austin, Mary. 171 pages, illustrated. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1961. Paper, $.95.

A literary gem of the great American Southwest, the land of the Shoshones and Paiutes and of the mesquite and coyote.

OUR LANDED HERITAGE: THE PUBLIC DOMAIN, 1776-1936. Robbins, Roy M. 450 pages, illustrated, bibliography, indexed. University of Nebraska Press, Lincoln, Nebraska. 1962. Paper, $1.95.

Well-documented history of the rise and development of the conservation movement in this country, which brought about the transference of our national resources from open public domain to permanent national ownership. (Originally published in 1942)

MAKERS OF NORTH AMERICAN BOTANY. Humphrey, Harry Baker. 265 pages. (Chronica Botanica No. 21) Ronald Press, New York. 1961. $6.00.

Brief biographical notes concerning one hundred and twenty-two North American botanists (none is now living) with an evaluation of the significant botanical work of each. Bibliographical references given for further study. A noteworthy contribution to the literature of North American botany.

THE NATURAL WORLD OF LOUISE DICKINSON RICH. Rich, Louise Dickinson. 195 pages, illustrated. Dodd, Mead and Co., New York. 1962. $5.00.

The author of *We Took to the Woods* has again given us a nostalgic masterpiece of nature writing of her beloved New England and of the state of Maine in particular.

PLANT HUNTERS IN THE ANDES, 2nd ed. Goodspeed, T. Harper. 378 pages, illustrated, indexed. University of California Press, Berkeley. 1961. $7.50.

This second edition, considerably enlarged, is an exciting, authentic account of six extensive botanical expeditions to the Andes of Colombia, Peru, Bolivia, Chile, Argentina, and Uruguay, organized and directed by the author and sponsored by the University of California Botanical Garden and other scientific organizations. Dr. Goodspeed is an able writer and gives a vivid picture of the peoples and plants he encountered.

THEODORE ROOSEVELT'S AMERICA; SELECTIONS FROM THE WRITINGS OF THE OYSTER BAY NATURALIST. Wiley, Farida A., ed. 409 pages, illustrated, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.45.

Thoughtfully compiled excerpts from Roosevelt's books, with biographical gems written by his daughter Ethel Roosevelt Derby, Ambrose Flack, John Burroughs, Gifford Pinchot, and Henry Fairfield Osborn.

TREASURES BY THE MILLIONS: THE STORY OF THE SMITHSONIAN INSTITUTION. Neal, Harry E. 192 pages, illustrated, indexed. Julian Messner, New York. 1961. $3.50.

A sprightly guide to a fabulous place — full of "human interest" vignettes and anecdotes.

THE UNICORN TAPESTRIES AT THE CLOISTERS. Rorimer, James J. 40 pages, illustrated (colored front.) Metropolitan Museum of Art, New York. 1962. Paper, $1.25.

Dr. Rorimer's knowledgeable descriptions and comments, together with the fine duotone offset illustrations, make this little booklet especially informative and charming.

THE VOYAGE OF THE BEAGLE. Darwin, Charles. 524 pages, illustrated, bibliography, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.45.

From the edition of 1860, the last to be revised by Darwin. Editor Leonard Engel's analytical notes help to clarify the historical and biographical background.

WILLIAM B. GREELEY: A PRACTICAL FORESTER: 1879-1955. Morgan, George T., Jr. 82 pages, illustrated, bibliography, indexed. Forest History Society, St. Paul, Minn. 1961. $2.95.

The Forest History Society publications are always worthy of note. The present is the work of a recipient of the Marion F. McClain Award in Pacific Northwest History, who has done extensive research in the personal papers of the late Colonel Greeley, one of Gifford Pinchot's ardent recruits in forestry conservation.

A WOMAN RICE PLANTER. Pennington, Patience. 466 pages, illustrated. (The John Harvard Library) Belknap Press of Harvard University Press, Cambridge, Mass. 1961. $6.00.

The text of this edition has been reprinted from the original plates preserved by the Carolina Art Association of Charleston, South Carolina. This is the diary, written during 1903 and 1904, by the daughter of Robert Alston, one of the prominent ante-bellum rice planters. Editor Cornelius O. Cathey has contributed a sympathetic introduction.

GENERAL NATURE STUDY AND SCIENCE

BETWEEN THE PLANETS, rev. ed. Watson, Fletcher G. 224 pages, illustrated, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.25.

Another of the excellent paperback series published in cooperation with The American Museum of Natural History. Dr. Watson, who is both astronomer and teacher, introduces to the general reader the world of meteors, comets, and asteroids.

HISTORY OF THE EARTH: AN INTRODUCTION TO HISTORIC GEOLOGY. Kummel, Bernhard. 610 pages, illustrated, bibliography, indexed. W. H. Freeman and Co., San Francisco. 1961. $8.75

A basic background text by a geologist of Harvard University, who has the ability to handle a vastly complex subject with precision and clarity. Well-illustrated with photographs, maps, and diagrams.

NATURAL HISTORY OF PLANTS AND ANIMALS. Olson, A. C. Jr., R. W. Crawford, and E. W. Huffman. 183 pages, illustrated, bibliography. The National Press, Palo Alto, Cal. 1961. Spiral, $4.75.

This laboratory manual, primarily designed for an elementary college course in biology, is just the thing for those who are looking for a clearly illustrated "teach yourself" guide. Contains quizzes, experiments, and references for collateral reading.

A TREASURY OF WORLD SCIENCE. Runes, Dagobert D., ed. 978 pages, illustrated. Philosophical Library, New York. 1962. $15.00.

Excerpts from some of the important writings of one hundred of the world's scientific pioneers and discoverers. The plant sciences are represented by Darwin, Galton, Humboldt, Lamarck, Linnacus, Mendel, and Pasteur.

WATCHERS AT THE POND. Russell, Franklin. 265 pages, illustrated. Alfred Knopf, New York. 1961. $4.50.

The setting—a pond in Canada; the time—a cycle of a year; and the theme—the comings and goings of the plants and animals in and about the pond. Well-written observations.

DRUGS AND SPICES

DRUGS, MEDICINES AND MAN. Burn, Harold. 248 pages, illustrated, indexed. Charles Scribner's Sons, New York. 1962. $4.50.

Dr. Burn, who is Emeritus Professor of Pharmacology of Oxford University and at present actively engaged in drug research, gives an authoritative and lucid survey of the history, nature, and action of many of the medicines which are used today. Written expressly for the intelligent layman.

MIRACLE DRUGS AND THE NEW AGE OF MEDICINE. Reinfeld, Fred. 126 pages, illustrated (part colored), indexed. Sterling Publishing Co., New York. 1962. $3.95.

Reads like a story book. Exceptionally well illustrated. A non-technical *vade mecum*.

SPICES: THEIR MORPHOLOGY, HISTOLOGY AND CHEMISTRY. Parry, John W. 226 pages, illustrated, bibliography, indexed. Chemical Publishing Co., New York. 1962. $8.75.

A ready reference manual with descriptions and drawings of the internal and external structures and simple chemical analyses of some fifty spices. This is by no means an exhaustive treatise, but rather a practical little book suited for students of food analysis and for herb and spice enthusiasts, who have access to a microscope or magnifying glass.

A TEXTBOOK OF PHARMACOGNOSY, 8th ed. Trease, George Edward. 808 pages, illustrated, bibliography, indexed. Williams and Wilkins, Baltimore. 1962. $9.00.

A well-revised edition of a standard text by the director of pharmaceutical studies in the University of Nottingham. Herb growers will find of particular interest the chapters on the history and cultivation of medicinal plants.

FOR YOUNG READERS

ANYONE CAN LIVE OFF THE LAND. Johnson, James R. 122 pages, illustrated. Longmans, Green and Co., New York. 1961. $2.95.

A first-rate "survival" guide by a former field executive for the Boy Scouts of America. Includes chapters on edible and poisonous plants.

ADVENTURES WITH A HAND LENS. Headstrom, Richard. 220 pages, illustrated. J. B. Lippincott Co., Philadelphia. 1962. $4.25.

Fifty "guided tours" for the inquisitive boy or girl into an invisible world of plants, animals, and minerals. Recommended for adults, also.

AN AQUARIUM. Blough, Glenn O. 36 pages, colored illustrations. (The Basic Science Education Series) Golden Press, New York. 1962. $1.69.

For youngsters who want to make a home aquarium. Attractive pictures in color and an easy-to-read text.

ENJOYING NATURE'S MARVELS. Aistrop, Jack B. 207 pages, illustrated, indexed. The Vanguard Press, 1961. $3.00.

Jack Aistrop is a keen observer and lover of all sorts of wild and tame creatures, from the praying mantis that lives on his terrace to the electric eel in the Aquarium at Coney Island. Many readers already know his *Dictionary of Pets*, *Fun at the Zoo*, and *Enjoying Pets*. His vivid and humorous accounts of his periodic visits to zoos in various parts of the world are highly entertaining.

EXPLORING THE SEACOAST. Perry, John and Jane G. 189 pages illustrated, indexed. Whittlesey House, McGraw-Hill Book Co. 1961. $3.50.

Youthful beachcombers and devotees of the seaside will find fascinating bits of information in this book on plants and animals which they frequently see. To add to the excitement, there is a chapter on shipwrecks, pirates, and smugglers. This is a companion volume to the author's *Exploring the River*.

FLOWERS AND WHAT THEY ARE. Elting, Mary. 59 pages, colored illustrations. (Whitman Learn About Book Series) Whitman Publishing Co., Racine, Wisconsin. 1961. $.59.

A delightful, botanically accurate picture book for very young beginners.

FLOWERS—CARRIERS OF LIFE. Boyle, E. Marie. 27 pages, illustrated, bibliography. (Beacon Science Series) Beacon Press, Boston. 1961. Paper, 75 cents.

One of a series of booklets designed to assist teachers and parents in presenting attractively the wonders of nature to preteen youngsters. Particularly useful are the sections entitled "Things to Think About and Do" and "Things To Do at Home."

FOREST FIRE FIGHTERS AND WHAT THEY DO. Harrison, C. William. 142 pages, illustrated, indexed. Franklin Watts, 1962. $3.95.

Fascinating reading for young adults. Exciting accounts of "spotters" and "hot-shot" crews; also, fire-fighting instructions and excellent information on preparation for Forest Service careers for men and women.

THE INSECT PARADE. Blough, Glenn O. 35 pages, illustrated (part colored). (Row, Peterson Basic Science Education Series) Golden Press, New York. 1962. $1.69.

Hard-cover reissue of a charmingly illustrated insect primer.

LAND OF PLENTY; THE AMERICAN FARM STORY. McMillen, Wheeler. 138 pages, illustrated, indexed. Holt, Rinehart and Winston, New York. 1961. $3.95.

Adult readers know Wheeler McMillen in his role as editor of the *Farm Journal* and as author of numerous agricultural titles. The present volume is a fascinating history of American agriculture. Although primarily written for teen ageers, it is good reading for oldsters as well.

THE LEAFY HOME OF THE BIRDS. Boyle, E. Marie. 30 pages, illustrated, bibliography. (Beacon Science Series) Beacon Press, Boston. 1961. Paper, $.75; cloth, $1.00.

Elementary lessons in tree study written in a bright conversational style. Parents and teachers will find particularly useful the parts entitled "Things to Talk About and Do" and "Things To Do at Home".

MY GARDEN GROWS. Watson, Aldren A. 32 pages, colored illustrations. The Viking Press, New York. 1962. $2.50.

The very, very young gardener (up to six years) will enjoy this cleverly illustrated toad's eye-view of how our common vegetables grow from tiny seed to harvest-size plants.

OCEAN HARVEST: THE FUTURE OF OCEANOGRAPHY. Vogel, Helen W., and Mary L. Caruso. 144 pages, illustrated. Alfred A. Knopf, New York. 1961. $3.00.

(Continued on page 198)

NEWS, NOTES and COMMENTS

The Annual Reception for the Graduates of the Two-Year Course in Botany and of the Two-Year Course in Practical Gardening was held at the Snuff Mill on Tuesday evening, June 19, 1962. T. H. Everett, Assistant Director (Horticulture), in welcoming the graduates and other guests, read a letter from Morton A. Waldman, D. D.S., from which this excerpt has been taken: "As graduation draws near and I am about to receive my second diploma, I am impelled to tell you how grateful I am for all the wonderful courses I have enjoyed at the Garden. I am also somewhat dismayed at having run out of material, or rather, courses to take. I am hoping you will one day have a course in winter identification, using a twig and bud key."

Dr. William C. Steere, Director, was the principal speaker; his topic, "A Botanist in the Arctic." Mrs. David Rockefeller, a member of the Board of Managers, presented certificates to Maxine Goodgion, John V. Hewitt, Jr., David F. Miller, Robert H. K. Murray, Pauline G. Schinman, and Lenore Wile in the botany course; to Lorraine Berman, Mrs. William Deyo, Carol C. Drought, Gladys Hicks, Michael Holavko, Richard A. Livellara, David F. Miller, Robert E. Ungemack, Morton A. Waldman, and Robert Wiechnick in the practical gardening course.

Retirement System. On July 1, 1962, the Garden joined with several other cultural institutions, which are supported by the City of New York, in forming a Cultural Institutions Retirement System. After many years of negotiations, the City has agreed to share with employees paid from City funds the cost of a retirement system. In addition to sharing the cost for current service, the City has agreed to pay the entire cost for an employee's back service since the age of twenty-five. The System provides group life insurance as well as retirement benefits. Approximately one hundred and twenty-five employees of the Garden participate in the Cultural Institutions Retirement System.

The Garden's professional and administrative staff members, who are paid from private funds, will continue to participate in the retirement system with the Teachers Insurance and Annuity Association.

Gift to the Herbarium. Over four thousand specimens of fungi and algae have been given to the Garden's Crytogamic Herbarium by the Library and the Department of Botany of Barnard College, Columbia University. These herbarium specimens were originally part of the library of the late H. M. Richards, a member of Barnard's faculty, and represent 46 volumes totaling 2,490 specimens collected by Collins, Holden, and Setchell of *Phycotheca Boreali-Americana*, algae exsiccata; 8 volumes totaling 657 specimens collected by Seymour and Earle of economic fungi exsiccata; and 14 boxes, totaling 998 specimens collected by Ellis and Everbard of fungi *Columbiana*, exsiccata.

Activities of Staff Members. Dr. Pierre Dansereau, Assistant Director (Botany) will return to the Garden in October after spending the past several months in research at the Montreal Botanical Garden and in field work on the Gaspé Peninsula.

T. H. Everett, Assistant Director (Horticulture), is now in Great Britain, where he is visiting botanic gardens, private gardens, and nurseries for the purpose of obtaining a variety of rare and unusual plants to add to the Garden's living plant collections.

Louis P. Politi, Horticulturist, spent August on the continent of Europe and in Great Britain, familiarizing himself with plant collections in botanical gardens and elsewhere.

Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Research, attended the Conference on Neotropical Botany at Trinidad, reported elsewhere in these pages; spent several weeks in Brazil before returning to Trinidad as a member of the working committee to set up the new Association for Tropical Biology. After a week in Trinidad, Dr. and Mrs. Maguire continued on their way to Venezuela, where he engaged in field work for eight weeks.

Dr. Maguire also visited Surinam where he held conferences in preparation for the 1963 expedition into the interior of that region. While in Paramaribo, he met Dr. Caroline Allen, Research Associate at the Garden, who is having an exciting and profitable experience on matters pertaining to her studies of the *Lauraceae*.

Dr. Clarke T. Rogerson, Curator of Cryptogamic Botany, engaged in field work the latter part of July and early August, in connection with monographic and life-history studies of hypocreaceous fungi under a grant from the National Science Foundation. He attended the meetings of the American Institute of Biological Sciences held at Oregon State University, Corvallis, on August 27-31, 1962.

Dr. Arthur Cronquist, Curator, who also attended these meetings, gave his "Presidential Address" before the American Society of Plant Taxonomists and served as moderator of the symposium on "The Origin and Evolution of Ferns." Dr. Cronquist lectured on taxonomy at the summer institute for college biology teachers held at Vanderbilt University, Nashville, Tennessee, in July. He will attend the biochemical taxonomic meetings at the University of Kansas, Lawrence, on September 10-13, 1962; then leave for Mexico for two months of field work on the *Compositae*.

Dr. David J. Rogers, en route to the A. I. B. S. meetings at Corvallis, Oregon, where he delivered a paper on "Origins of *Manihot esculenta*" before the American Society of Plant Taxonomists, visited several institutions. At the Missouri Botanical Garden, St. Louis, he conferred with Dr. Edgar Anderson; at Kansas State College, Manhattan, with Dr. T. D.

Upper left. Mrs. David Rockefeller presents a certificate in practical gardening to Dr. Morton A. Waldman. She is assisted by Mrs. Lillian Weber, left, and Miss Nancy Callaghan, right, of the Educational Department.

Lower left. T. H. Everett reads a letter from Dr. Waldman, which is enjoyed by Mrs. Rockefeller, Mrs. Weber, and Dr. William C. Steere.

Below. Robert F. Kolkebeck addresses the employees, gathered in the Lecture Hall of the Museum and Administration Building, on the retirement system.

These photographs of the Rose Garden at The New York Botanical Garden were taken on the twentieth annual Rose Day, June 6, 1962.

Below are three of the artistic arrangements featuring roses that were on display in the Rotunda of the Museum and Administration Building on Rose Day.

Left. White roses, white larkspur, and podocarbus were most effectively arranged in a silver trophy by Mrs. Robert E. McNeill, Jr., of Montclair, New Jersey.

Center. Rose 'Tropiciana' was shown to advantage against driftwood in a brass container by Mrs. Vincent P. Whitsitt of Scarsdale, New York.

Right. Roses 'Sterling Silver' and 'Pink Sweetheart' and miniature carnation 'Tinker Bell' were pleasingly arranged in a porcelain container by Mrs. Charles L. Auger, Jr., of Englewood, New Jersey.

Dahlias 'Hock's Yellow', left, and 'Lavender Perfection', above, in the dahlia planting at The New York Botanical Garden.

Barkeley. He also visited with faculty members at Colorado State College at Colorado Springs and at the University of California at Berkeley.

Dr. Alma Barksdale, Senior Research Associate, and her husband, Dr. Lane Barksdale, Professor of Microbiology at New York University Medical School, attended the eighth International Biological Congress in Montreal, Canada, August 19-24, 1962.

Richard J. Brown was appointed Superintendent of Buildings and Grounds of The New York Botanical Garden, effective June 28, 1962, to fill the position left vacant by the resignation of Vincent Rampino.

The Dahlia Planting at The New York Botanical Garden is a trial garden to which new dahlia varieties are sent to be grown under good cultural conditions, and their merits scored by competent judges. It is one of eight such gardens located in dahlia-growing areas from coast to coast, all of them planted and cared for under uniform rules specified by the American Dahlia Society.

This year The New York Botanical Garden has sixty-seven new varieties on trial; there are three plants of each variety. Two varieties were in bloom on the first of July, but the main display will occur during September and early October; the peak will probably be reached from mid-September until the end of the first week in October. During these weeks nearly all of the plants should be in bloom at one time or another, displaying a range of size, form, and most of all color to be found in few, if any other flowers. The blooms will continue until frost, but after mid-October perfection declines, and the specimen blooms are fewer in number. Photographers with color film in their cameras frequently visit this attractive planting.

Every Sunday morning during the blooming season, weather permitting, judges from the American Dahlia Society will score the merits of the varieties on trial. They will be glad to answer questions on dahlia culture, which visitors to the Botanical Garden may ask . B. E. P.

Visitors to the Garden.

Dr. R. A. Pursell of the School of Forestry, Pennsylvania State University, Mont Alton, and Dr. William D. Reese, University of Southwestern Louisiana, Lafayette, spent July in the Cryptogamic Herbarium in connection with their joint project on the mosses of the Gulf Coast of Mexico and the United States.

Dr. Paul Lentz, mycologist, National Fungus Collections, Beltsville, Md., spent two days this summer at the Garden, studying resupinate hydnaceous fungi.

Dr. Colin Booth of the Commonwealth Mycological Institute, Kew, England, visited the garden for two days in July to examine the collections of *Nectria* in the Cryptogamic Herbarium.

Dr. Lewis E. Anderson, Duke University, Durham, N. C.

Dr. William T. Winne, Union College, Schenectady, N. Y.

Yasuyuki Hiratsuka, Purdue University, Lafayette, Ind.

Dr. W. M. Farrow, Research Department, Hoffman LaRoche, Nutley, N. J.

Dr. G. C. Ainsworth, C.M.I., Kew, Surrey, England.

Dr. Joan M. Dingley, Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, N. Z.

Dr. William Tweedy and Dr. Eli V. Crisan, Boyce Thompson Institute for Plant Research, Yonkers, N. Y.

Dr. J. T. Spencer, National Science Foundation, Washington, D. C.

Dr. Walter H. Hodge, National Science Foundation, Washington, D. C.

Dr. Bobb Schaeffer, American Museum of Natural History, New York, N. Y.

George R. Proctor, Institute of Jamaica, Kingston, Jamaica, West Indies.

John B. Routien, Chas. Pfizer & Co., Groton, Conn.

Philip H. Cox Jr., Bloomfield, N. J.

Paul A. Colanvaux, Department of Zoology, Duke University, Durham, N. C.

Robert A. Vines, Museum of Natural History, Houston, Texas.

Arturo Gonzáles Más, University of Puerto Rico, Rió Piedras.

Homer V. Linkley, University of Michigan, Ann Arbor, Mich.

Dr. Harold N. Moldenke, Director, Trailside Museum, Watchung Reservation, Mountainside, N. J.

Eduardo Salgado, Artist, New York, N. Y.

Matthew Kalmenoff, American Museum of Natural History, New York, N. Y.

Dr. Richard Greminger, Cornell Medical College, New York, N. Y.

George R. Cooley, Gray Herbarium, Cambridge, Mass.

Dr. Barbara Bachmann, Department of Microbiology, Yale University, New Haven, Conn.

Dr. A. Lima de-Faria, University of Lund, Sweden.

Dr. T. Scott, Princeton University, Princeton, N. J.

Andrew Geddes, Auckland, New Zealand.

Walter L. Brytczuk, U. S. Metals Refining Co., Carteret, N. J.

Dr. Karl Rokitousky, Vienna, Austria.

Dr. Zelowsky, College of Agriculture, Warsaw, Poland.

Dr. and Mrs. William Prescott, Princeton University, Princeton, N. J.

Hiroshi Suzuki, Tokyo, Japan.

A Neotropical Botany Conference was held at the Imperial College of Tropical Agriculture, Trinidad, which is the Agricultural Faculty of the University of the West Indies, July 1-7, 1962. Thirty delegates from Latin America, the United States, Holland, and the Caribbean attended under a travel grant from the National Science Foundation.

Through discussions at the Conference it became evident that the field should not be limited

Dr. P. P. Pirone, left, stands beneath *Fraxinus angustifolia* 'Doctor Pirone', named in his honor by Edward Scanlon, right, owner-manager of Tailored Tree Nursery. Olmsted Falls, Ohio, and publisher of *Trees Magazine*.

Some five hundred clones of this ash, propagation of which began in 1957, have developed the same beautiful form and glossy foliage of the original tree. *F. angustifolia* 'Doctor Pirone" became available to the trade this spring.

to neotropical botany but should cover tropical biology as a whole, more particularly because of the findings of the conference on problems in education and research in tropical biology that was held in April, 1962, at the Universidad de Costa Rica, San José. To further this aim, the Association for Tropical Biology was initiated at the Trinidad Conference. The purpose and function of the new association will be: a) to stimulate, encourage, and support research in tropical biology; b) to promote the training and interchange of students, teachers, and investigators in the field; c) to develop facilities to attain this object.

Dr. Tobias Lasser, Director of the Instituto Botánico, Caracas, Venezuela; Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Research at The New York Botanical Garden, and Dr. J. W. Purseglove, Professor of Botany at the University of West Indies, St. Augustine, Trinidad, were appointed a working committee. Alternates to the committee, of which Dr. Purseglove is Chairman, are Dr. C. D. Adams, Senior Lecturer in the Botany Department at the University of the West Indies, Jamaica, Dr. Alvaro Fernández-Pérez, Director of the Department of Botany, Universidad Nacional de Columbia, Instituto de Ciencias Naturales, Bogotá; and Dr. Stanley C. Cain, Charles Lathrop Pack Professor of Conservation at the School of Natural Resources, University of Michigan.

Membership in the new association is open to all who are interested in tropical botany. The fee of $1.00 U.S. or its equivalent should be paid to Professor Purseglove. Those who join before December 31, 1962, will be Founder Members.

The Garden Club of America, at its annual meeting held in Lenox, Massachusetts, presented the Founder's Award Fund to the Garden Club of St. Louis, towards the club's project of planting a mist forest in the Climatron at the Missouri Botanical Garden; the Gold Medal of Honor to George Campbell Munro for his work in establishing the Na Laau Hawaii Arboretum for native plants on Diamond Head; the Margaret Douglas Medal to Mrs. Joseph H. Thompson for her work in promoting industrial landscape and in preserving the natural beauty along Ohio's highways; the Florens DeBevoise Medal to H. Lincoln Foster for achievements in hybridizing rock garden plants; the Eloise Payne Luquer Medal to Elizabeth Remsen Van Brunt for achievements in the field of botany, and for experiments in plant breeding and soil testing in cooperation with the Sloan-Kettering Institute's research program on cancer; the Distinguished Service Medal to Mrs. Charles Bittinger for her part in developing Fern Valley in the United States National Arboretum; the Amy Angell Collier Montague Medal to the French Broad River Garden Club of Asheville, North Carolina, for preserving the native cut holly industry in its area.

Dr. Charles Glen King, who is an authority on nutrition and diet, retired from the faculty of Columbia University, on June 30, 1962. In 1942 he joined the University as a visiting professor, and in the same year was named scientific director of the Nutrition Foundation, Inc. Four years later. he was appointed a full professor of chemistry at Columbia.

Almost as strange in the plant world as the giraffe in the animal world is *Zamioculcas zamiifolia,* which flowered for several weeks (May-June, 1962) in the Conservatory at The New York Botanical Garden. A native of tropical Africa, it is a member of the Arum family.

In many woodland areas, particularly where it is swampy, jack-in-the-pulpit and skunk cabbage abound. These are native wild flowers of the Arum family. In flower shops other members of the family, such as calla lilies, caladiums, anthuriums, spathiphyllums, and philodendrons, ore often seen. Most arums are natives of tropical countries.

With few exceptions, these plants are known by their unique manner of flowering. They have tiny flowers arranged like jewels on a fleshy stalk (spadix), generally with minute female flowers near the base and minute male flowers above. Sheltering or enhancing the flower stalk is a leaf-like bract (spathe) which may be variegated, brightly colored, or otherwise conspicuous.

The leaf pattern in the family is almost always one of simple leaves, or leaves not made up of leaflets, and the inflorescence showy. *Zamioculcas* is a "black sheep" in the Arum family. Its flowers are close to the ground and well-hidden from view by the bold, heavy-textured, compound leaves three feet or more in length. The leaflets are jointed to the

leaf stalk and form small tubers at their bases after they fall---a means of propagation in addition to seed—just to be sure that there will be more zamioculcas.

Of the thousands of plants at The New York Botanical Garden, none has a stranger name than this. HWS

In 1949, Dr. King received the John Scott Award of the City of Philadelphia for his "outstanding work on the chemistry of Vitamin C."

While he was on the faculty of the University of Pittsburgh, Dr. King was largely responsible for the establishment of the Buhl Foundation Research Group in Chemistry, Physics, and Biology.

Dr. King is a member of the Advisory Council of the National Institutes of Health and a special consultant to the Office of the Surgeon General and of the United States Public Health Service. Until his retirement, he was one of the four members appointed to the Board of Managers of The New York Botanical Garden by Columbia University.

Honorary Degree to Leonard Brass. The Honorary Degree of Doctor of Science was awarded by Florida State University to Leonard Brass, Staff Botanist at the Archbold Biological Station at Lake Placid, Florida. The citation by Dr. Gordon W. Blackwell, President of the University, reads: "Native of Australia, naturalized citizen of the United States, resident of Florida, staff botanist at the Archbold Biological Station, Lake Placid. Over the past thirty-five years, representing American insti-

tutions, notably the Arnold Arboretum of Harvard University and the Archbold Expeditions of the American Museum of Natural History, you have been an indefatigable explorer under the exceptionally difficult conditions of the humid tropics. Your botanical specimens, rich in numbers, carefully selected, meticulously prepared, and annotated with essential field notes, are incorporated in holdings of the leading museums of the world. Your collections have included many genera and species new to science and have formed the basis not only for your own extensive writings, which are models of clarity, but also for more than one hundred and fifty monographs by distinguished specialists. In addition, you have shown extraordinary qualities of leadership and a capacity for generous sharing of your knowledge to the benefit of the scientific world."

A "Chrysanthemum Festival" tour of Japan will be conducted by Cornelius Ackerson, Past President of the National Chrysanthemum Society, Inc., U.S.A., and editor of its publications. Mr. Ackerson, who is author of *The Complete Book of Chrysanthemums*, is collaborating with Yoshiaki Ogawa of Kurume, Japan, on "Japanese Chrysanthemum Art," to be published as a book.

The tour will depart from Los Angeles for Honolulu on November 3, 1962, and from Tokyo for Los Angeles on November 21. Arrangements are being made by Lindblad Travel Inc., 1 East 53rd Street, New York 22, N. Y., from which full particulars may be obtained.

BOOK REVIEWS (Continued from page 193)

An excellent account of plant and animal exploration in the waters below the surface of the oceans. Botanically inclined children will find of particular interest the descriptions and economic uses of ocean plants.

OBSERVATIONS AND EXPERIMENTS IN NATURAL HISTORY. Dale, Alan. 148 pages, illustrated, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1962. Paper, $.95.

A stimulating introduction to natural history by means of projects. Written by an English schoolmaster and adapted for American readers by James D. and Rebecca H. Witherspoon. Science-fair contestants will welcome the numerous suggestions for experiments and demonstrations.

ROCKS THAT CAPTURED HISTORY. Kingsbury, Edith C. 30 pages, illustrated, bibliography. (Beacon Science Series) Beacon Press, Boston. 1961. Cloth, $1.00.

Splendid teaching aid for elementary fossil study.

STELLER OF THE NORTH. Sutton, Ann and Myron. 231 pages, illustrated, bibliography, indexed. Rand, McNally and Co., Chicago. 1961. $3.50.

Ten- to twelve-year-old boys who like tales of adventure will enjoy this life story of George Wilhelm Steller, an eighteenth-century young naturalist who was the first white man to set foot on Alaskan soil and who collected, studied, and described many of the plants and animals he saw.

WATER AND THE THIRSTY LAND. Jeanes, Charlotte and Raymond Carlson. 28 pages, illustrated (part colored). Follett Publishing Co., Chicago. 1961. $2.50.

One of the intriguing Nature-Adventure Books with splendid colored illustrations from *Arizona Highways* magazine. A water-conservation story.

WATER: ITS FORM AND MOTION. Boyle, E. Marie. 26 pages, illustrated, bibliography. (The Beacon Science Series) Beacon Press, Boston. 1961. Cloth, $1.00.

An excellent title in The Beacon Science Series, primarily written for teachers and parents of pre-teen age children.

WHAT IS SOIL. Syrocki, B. John. 48 pages, colored illustrations. (The What Is It Series) Benefic Press, Chicago. 1961. $1.80.

Easy-to-read text and accurately executed illustrations for youngsters from nine to twelve.

WONDERS OF THE WASP'S NEST. Lavine, Sigmund A. 63 pages, illustrated, indexed. (Dodd, Mead Wonder Books Series) Dodd, Mead and Co., New York. 1961. $3.00.

A companion volume to the author's *Wonders of the Anthill* and *Wonders of the Hive*. Mr. Lavine, a teacher for many years in the Boston schools, writes with a facile pen.

YOUNG AMERICA'S GARDEN BOOK. Bush-Brown, Louise. 280 pages, illustrated, indexed. Charles Scribner's Sons, New York. 1962. $4.50.

Author and publisher deserve much praise for this offering. The text, drawings, photographs, and typography are admirable. Written in a stimulating style which will hold the interest of young people. Also an ideal "starting out" gardening text for grown-up beginning gardeners.

PLANTS AND GARDENING PRACTICES

AMERICAN ROSE ANNUAL: 1962. McLean, L. G., ed. 201 pages, illustrated (part colored), bibliographies, indexed. American Rose Society, Columbus, Ohio. 1962. $4.50.

Extensive coverage of recent findings in rose growing and hybridizing. Includes regional reports, articles on Miniatures, fragrance, viruses, cotton root rot, foliar feeding, mulches, imported varieties, breeding for hardiness, and four recipes for potpourri.

CARNATIONS UNDER GLASS, 2nd ed. (Great Britain. Ministry of Agric., Fisheries and Food Bull. No. 151) 42 pages, illustrated. British Information Services, New York. 1961. Paper, $.90.

An excellent government bulletin dealing with up-to-date carnation culture as practiced in the British Isles.

DELPHINIUMS. Parrett, Ronald C. 205 pages, illustrated, indexed. Penguin Books, Baltimore. 1962. Paper, $1.65.

One of Britain's foremost delphinium amateur growers has written a most comprehensive little book on the history, propagation, breeding, and cultivation of delphiniums. This is a welcome addition to the Penguin Handbook Series which is being prepared in conjunction and collaboration with the Royal Horticultural Society.

GARDENING IN THE SHADE, rev. ed. Morse, Harriet K. 242 pages, illustrated, indexed. Charles Scribner's Sons, New York. 1962. $5.95.

A revised edition of a highly esteemed work that has been out-of-print far too long. Excellent sections on herbs and house plants and fine new photographs have been added. Mrs. Morse is a member of the Garden.

THE GOLDEN GUIDE: A PRACTICAL HANDBOOK OF GARDENING AND OUTDOOR LIVING. Strohm, John, ed. 176 pages, illustrated (part colored), indexed. Golden Press, New York. 1961. Paper, $1.00

Prepared in cooperation with Ford Motor Company. Issued in 1960 under the title *Mercury Garden Guide*. A handy little aid for the neophyte.

HOW TO MAKE YOUR GARDEN GROW GREENBACKS: A PRACTICAL GUIDE TO RAISING LESS-COMMON PERENNIALS. Schnelz, Fred C. 140 pages, illustrated, indexed. Exposition Press, New York. 1961. $3.50.

The author, a retired business man who is a high-ranking amateur gardener, chooses nineteen easily cultivated perennials and convincingly demonstrates their possibilities as a profitable low-investment hobby. A very practical, informative text with considerable space devoted to propagating procedures.

TREES AND VINES

ALL ABOUT VINES AND HANGING PLANTS: FOR INTERIOR DECORATION, IN THE LANDSCAPE, IN CONTAINER GARDENING. Brilmayer, Bernice. 384 pages, illustrated (part colored), bibliography, indexed. Doubleday and Co., Garden City, N. Y. 1962. $5.95.

A well-illustrated work containing a great deal of information on the identification, growing, and use of vines and hanging plants indoors and out. Appended is a useful guide to commercial sources of plants and containers and an exhaustive list of popular names of plants with their Latin equivalents.

HAND-LIST OF CONIFERAE, CYADACEAE AND GNETACEAE IN THE ROYAL BOTANIC GARDENS, KEW AND THE NATIONAL PINETUM, BEDGEBURY, 5th ed. 41 pages. British Information Services, New York. 1961. Paper, $.95.

An important "reference tool" for horticulturists and botanists.

THE HOME OWNER'S TREE BOOK: A PLAIN-SPOKEN MANUAL FOR NON-PROFESSIONAL TREE LOVERS. Martin, John Stuart. 165 pages, illustrated, bibliography, indexed. Doubleday and Co., Garden City, N. Y. 1962. $3.95.

A sensibly presented manual for "new" and "old" home owners, who need practical advice on tree evaluation (selection and rejection) and cultural instructions in planting, feeding, pruning, spraying, and simple tree surgery. Appendix contains shade tree evaluation lists (for seven climatic regions of the United States and

eastern Canada) formerly published by the National Shade Tree Conference and the National Arborist Association.

FLOWER ARRANGEMENT

JAPANESE FLOWER ARRANGEMENT NOTEBOOK. Kroh, Patricia. 159 pages, illustrated (part colored), bibliography, indexed. Doubleday and Co., Garden City, N. Y. 1962. $5.95.

The author of *Design with Flowers, Unlimited* (1959) has devoted her present book to the teaching, step-by-step, of flower arrangement based on her studies in four Japanese schools, namely, Ikenobo, Enshu, Ohara, and Sogetsu. In addition to the main body of this work, there are chapters on the tea ceremony, Japanese gardens, the history and philosophy of Japanese floral arrangements, and a glossary of Japanese word equivalents.

PRESSED FLOWER PICTURES AND CITRUS-SKIN DECORATIONS. Booke, Voorhees. 228 pages, illustrated (part colored), indexed. D. Van Nostrand Co., Princeton, N. J. 1962. $6.95.

Decorative dried flower pictures, so popular in our grandmother's day, are staging a comeback, to judge from the interest shown in these displays at recent flower shows. Mrs. Booke, an experienced lecturer and blue-ribbon winner, has written a practical, generously illustrated guide which covers many facets of this fascinating hobby, such as seed mosaics, plastic mounts, ink, spatter, and blueprints, arrangements for paper weights, trays, and lampshades.

NATURE PHOTOGRAPHY. Bennett, Edna. 125 pages, illustrated, indexed. Universal Photo Books, New York. 1961. Paper, $1.95.

Knowledge of both nature and photography is a "must" to photograph nature and her many subjects well. This knowledge is greatly evident in Edna Bennett's book. Furthermore, her deep feeling, her understanding and love of nature give the book a vital quality.

The twelve compact chapters are written in simple language and have many illustrations, so that both beginner and advanced amateur can easily understand and profit from her information and suggestions. The many facets of nature are well represented, such as flowers, animals, marine life, land and seascapes. For the more advanced and specialized nature photographer a book of this size cannot give highly detailed and technical information. However, the author leads the interested nature photographer in the right direction with useful hints. For those who are seeking information and guidance in photographing nature, this compact little book can be of great value. WALTER SINGER

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REVIEWS OF BOTANICAL BOOKS

AN INTRODUCTION TO PLANT BIOLOGY. Braungart, Dale C. and Ross J. Arnett, Jr. 411 pages, illustrated, indexed. C. V. Mosby Co., St. Louis, Mo. 1962. $7.00.

This new text, evidently designed for a one-semester course, is written by two experienced teachers, one a cytogeneticist, the other an entomologist. It is well produced, handsomely illustrated, and easily read. Emphasis is placed on representative kinds of plants as whole organisms rather than on detailed morphology or biochemistry of plants in general, but respiration and photosynthesis are taken up at some length. An unusual feature is a sixty-page chapter giving twenty-two life cycles of plants, from Nostoc to Lilium. The classification is a mixture of traditional, modern, and novel, without much attention to the International Rules of Botanical Nomenclature.

Some small errors or misleading statements are practically unavoidable in any comprehensive textbook, but it is a little jarring to see umbel consistently misspelled as umble, to see a diagram of a *Prunus* flower labeled as having an "inferior" ovary, and to see only Guatemala mentioned as the homeland of *Cinchona*. It is to be hoped that these and other inaccuracies can be corrected in a subsequent edition.

ARTHUR CRONQUIST

THE SCIENCE OF BOTANY. Weisz, Paul B. and Melvin S. Fuller. 562 pages, illustrated, indexed. McGraw-Hill Book Co. Inc., New York. 1962. 08.95.

The textbooks of botany, like those of other sciences, have undergone radical transformations in the past several decades, and the process is evidently still under way. The organization and emphasis in this new book appear to be completely original; at least they are unlike any other known to the reviewer. Biochemical features, such as the Krebs cycle, modern hypotheses of the details of photosynthesis, and concepts of electron tronsfer, are presented at some length. Growth processes are emphasized, but there appears to be no discussion of the nitrogen-phosphorus balance in relation to flowering and fruiting, nor any list of the elements necessary for plant growth. The Watson-Crick model of chromosome structure is explained, but hybrid corn and the whole concept of heterosis are apparently missing. Classical morphology receives somewhat less attention than has been the custom, and economic importance is excluded from consideration. The suitability of a book of this sort as a basic text will necessarily depend on the outlook of the instructor.

ARTHUR CRONQUIST

BIOLOGICAL TRANSMISSION OF DISEASE AGENTS. Maramorosch, K. ed. 192 pages, illustrated, indexed. Academic Press, New York, 1962, $7.00.

The various agents capable of transmitting many important plant and animal diseases are discussed in these thirteen papers, originally presented at a symposium sponsored by the Entomological Society of America in 1960. The contributors are among the best authorities in their fields. The book is very ably edited by one of the very top men in the plant virus field. It should prove extremely useful to graduate students in virology, epidemiology, preventive medicine, and related fields. P. P. PIRONE

ART AND THE SCIENTIST. Lapage, Geoffrey. 115 pages, illustrated, indexed. The Williams and Wilkins Co., Baltimore, Md. 1961. $8.50.

This book discusses drawings and paintings made by the scientist either for his own works or the works of other scientists. The author

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considers such questions as: should artistic qualities be present in illustrations in scientific works? Can a scientist who has artistic feeling and ability keep artistic quality out of any drawings or paintings which he does?

The author says that when a scientist is doing scientific work, he is acting as a discoverer and is working in an impersonal way; but when he is producing the drawings considered in this book he is explaining his science and at this point he is more the individual, more personal. In this instance the scientist is comparable to the artist whose work depends on his being the individual. Therefore, the author feels that when the scientist is explaining his work, it is quite proper for him to use any artistic techniques he may have at his command as long as the science does not suffer.

Several fine color plates are included in the illustrations. Illustrations from works on botany, zoology, and human and comparative anatomy are the ones discussed, since these are the sciences which chiefly require graphic illustration. CHARLES C. CLARE, JR.

A HANDBOOK OF BIOLOGICAL ILLUSTRATION. Zweifel, Frances W. 131 pages illustrated. indexed. University of Chicago Press, Chicago, 1962. Paper, $1.95.

This excellent little volume contains concise information for artists and biologists on the various aspects of biological illustration, and is highly recommended. The topics are lucidly treated and include materials, printing processes, drawing techniques, preparation of graphs and maps, and lettering.

CHARLES C. CLARE, JR.

EARLY PLEISTOCENE FLORAS FROM THE CHAGOOPA SURFACE, SOUTHERN SIERRA NEVADA. Axelrod, Daniel I. and William S. Ting. 119—193 pages, illustrated. University of California Press, Berkeley 4, Cal. 1961. Paper, $1.50.

This volume is an additional piece of the identification and correlation puzzle which gradually grows to fruition, following hard on the heels of macropaleobotany. Pollen profiles present contributory evidence—in the absence of macrofossils, sometimes the only evidence—of floral existence, plant distribution, and dispersal. Axelrod and his students are protagonists in this field.

The paper under discussion treats an Early Pleistocene (Kansan) flora of the so-called Chagoopa Surface, which stretches from Canada into central and southern California. It embraces floras (pollen) from the Kern Plateau and the southern Owens Valley presenting floristic, climatic, and structural evidence for age and correlation. The gymnospermous element is especially prevalent, containing many genera of the *Pinaceae, Cupressaceae,* and *Taxaceae.* Deciduous trees are equally represented, and several genera were identified among the herbs.

With excellent plates of pollen photographs, this paper is a valuable addition to palynological and paleoecological literature.

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Geo. W. Park Seed Co., Greenwood 129, S. C.

PLANT LIFE OF PALESTINE (Israel and Jordan). Zohary, Michael. 262 pages, illustrated, indexed. The Ronald Press Co., New York. 1962. $8.00.

The flora and vegetation of Palestine is expertly treated. Its diversified ecologic problems, based on contrasting climates and soil conditions, are clearly stated. Over two thousand vascular plants have contributed to a diagnosis of phytogeographical affinities and biogeographical areas for the native flora, as well as to agricultural application. The arboreal vegetation is stressed for reasons of urgent soil conservation and reforestation of potential areas. Diagrams, charts, and other illustrations enhance the value of this scholarly book.

HERMAN F. BECKER

ECOLOGY OF INLAND WATERS AND ESTUARIES. Reid, George K. 375 pages, illustrated, indexed. Reinhold Publishing Corp., New York. 1961. $7.50.

This book is intended to introduce the student to the physical, chemical, and biological features of fresh water lakes, streams, and estuaries and to the dynamic nature of the aquatic environment. ALMA W. BARKSDALE

PHARMACOGNOSY. Edward P. Claus. 565 pages, illustrated, indexed. Lea & Febiger, Philadelphia. 1961. $12.50.

This is the latest edition of a textbook that first appeared in 1936 under the name of Gathercoal and Wirth: *Pharmacognosy.* Though the text is designed for use in teaching pharmacology to students of pharmacy, it is also a useful reference for anyone who is interested in medicinal plants. It is very readable, well organized, and well illustrated.

ALMA W. BARKSDALE

PLANT GROWTH REGULATION: Fourth International Conference on Plant Growth Regulation. 850 pages, illustrated, indexed. The Iowa State University Press, Ames, Iowa. 1961. $8.50.

The papers that were presented at the Fourth International Conference on Plant Growth Regulation, jointly sponsored by the Boyce Thompson Institute, The New York Botanical Garden, and the Brooklyn Botanic Garden, are combined in a book under the editorship of Dr. R. M. Klein of The New York Botanical Garden.

ALMA W. BARKSDALE

FORM AND FUNCTION IN PLANTS. Dodd, John D., xii + 233 pages, illustrated, indexed. Iowa State University Press, Ames, Iowa, 1962. $6.50.

As is so often the case, this book originated in a course in Botany. Professor Dodd of Iowa State University has taught general botany for many years and has now prepared an elementary text based on his course. I would judge that it is a good course for the book is, within its limitations, good. It is unusually well illustrated with both photographs and drawings, and the text is adequate.

The title is, however, misleading. Form and function are intimately related in fact, but not in the text. In some cases, the physiological information is unduly simplified or outdated; in other cases, there is only a cursory treatment of function. Although the book would serve admirably for a student already intellectually commited to plant science, I doubt whether this book would generate the excitement necessary to bring a student into botany.

RICHARD M. KLEIN

LETTERS TO THE EDITOR

First, let me say how much I appreciate your help in my bonsai interest. Second, is it possible to obtain a copy of *The Garden Journal* containing the article on "Instant Bonsai" by Marjorie Wihtol? Third, may I subscribe to *The Garden Journal*?

I have spent many hours walking through The New York Botanical Garden, especially during World War II when I was stationed, as a GI, for several months in Manhattan and on Governors Island. Many Sundays I went to the Garden early in the morning, spent the day there, and timed my departure so that I would arrive at Times Square just as the Stage Door Canteen opened. There I could get a free meal: one apple, one peanut butter sandwich, one carton of milk, one doughnut. Having walked around the Botanical Garden all day without lunch, I usually felt the need to go through the meal-line twice!

GEORGE HULL, Garden Editor
The Chattanooga (Tenn.) Times

MEMBERSHIP

We were delighted to welcome the following new members between June 1, 1962, and July 31, 1962.

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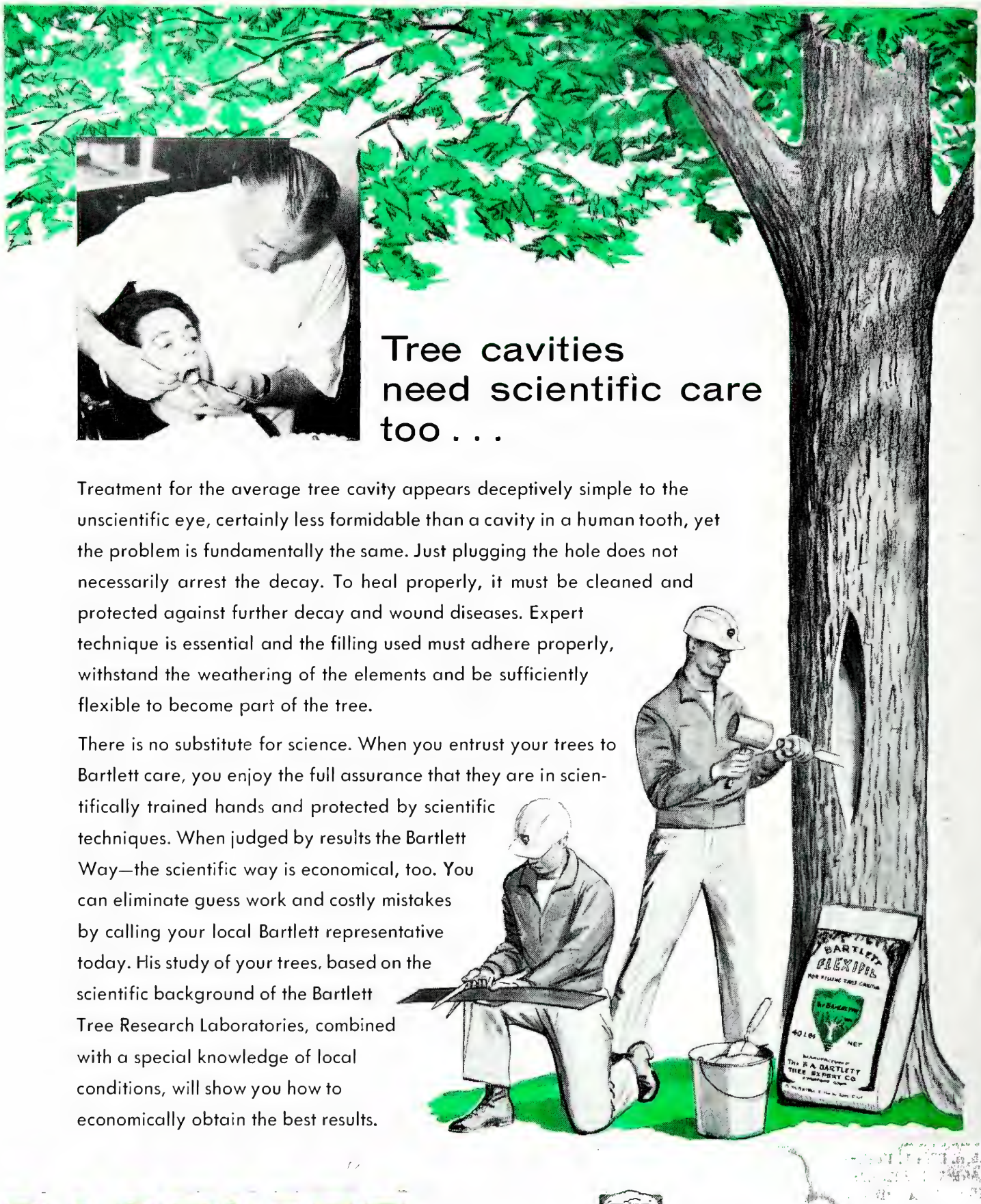

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THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

Vol. 12, No. 6 November-December, 1962

THE GARDEN JOURNAL

THE NEW YORK BOTANICAL GARDEN

DOROTHY EBEL HANSELL
Editor

CALENDAR

November 10 - 30, 1962. Chrysanthemum Show in the Conservatory of The New York Botanical Garden.

December, 1962. Early this month a special exhibit of the work done by students of Edgar A. Whitney, A.W.S., who is the instructor for the Garden's course in "Flower and Landscape Painting in Water Color," will be staged in the Museum Building of The New York Botanical Garden. This colorful feature will add considerable interest to the many excellent exhibits tastefully arranged throughout the year by Mrs. Charles Burlingham, Honorary Curator of Museum Exhibits.

December 4, 1962. Theater Benefit—"Lord Pengo," starring Charles Boyer, at the Royale Theater—sponsored by the Volunteer Associates of The New York Botanical Garden.

December 6, 1962. Holiday House Tour in New York, N. Y., sponsored by The Volunteer Associates of The New York Botanical Garden.

December 14 - 31, 1962. Christmas Show in the Conservatory of The New York Botanical Garden.

January 9, 1963, 10 a.m. - 3 p.m. Special One-Day Course, "House and Small Greenhouse Plants," at The New York Botanical Garden.

January 10, 17, 24, and 31, 1963. Downtown Lecture Series, sponsored by The Volunteer Associates of The New York Botanical Garden.

March 9 - 17, 1963. International Flower Show, Coliseum, New York, N. Y. Theme: "Gardens are for Living."

March 10 - 16, 1963. Spring Flower Show, Trade and Commercial Center, Philadelphia, Pa.

March 16 - 24, 1963. Ninety-second Annual New England Flower Show, Wonderland Park, Revere, Mass. Theme: "Wonderland of Spring."

March 19 - 20, 1963. International Flower Show, City Hall, Cape Town, celebrating the "Golden Jubilee" of the National Botanic Gardens of South Africa, Kirstenbosch.

April 17, 1963, 10 a.m. - 3 p.m. Special One-Day Course, "Flowering and Berried Trees and Shrubs," at The New York Botanical Garden.

April 26 - October 13, 1963. International Horticultural Exposition, Hamburg, West Germany.

May 6, 1963. Annual Meeting of The New York Botanical Garden.

June 8, 1963. Twenty-first Annual Rose Day at The New York Botanical Garden.

October 9 - 12, 1963. Eighteenth annual American Horticultural Congress, Missouri Botanical Garden, St. Louis, Mo. Hotel headquarters: Chase-Park Plaza.

April - October, 1964. "Gardens of the Nations"—International Garden Show, Vienna, Austria. For information, write to Exhibition Secretariat, WIG 64, Wiener Stadthalle-Stadion Betriebsgesellschaft m.b.h., Vienna 15, Vogelweidplatz 14, Austria.

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CREDIT FOR ILLUSTRATIONS

We are indebted to the Display Committee, Mrs. Charles Burlingham, Chairman, for the selection of the front cover illustration—*Bromelia balansae*, photographed by Walter Singer in the Conservatory of The New York Botanical Garden; inside front cover, the dome of the Conservatory of The New York Botanical Garden, photographed by Walter Singer; pp. 201-203, Ivan N. Anderson; pp. 204-207, Will Tillitson's Roses, Watsonville, Cal.; pp. 210, 211, Walter Singer; p. 213, H. D. Ripley; p. 215, Bernice Winkler; pp. 217-219, Pierre Dansereau; pp. 220, 221, Foster Botanical Garden; p. 223, Fred Rackle-courtesy Constance Hartt; p. 224, Dole Photo, Hawaii; p. 225, Castle and Cooke Photo, Hawaii; p. 226, Hawaiian Sugar Planters' Association, Experimental Station; p. 227, Constance Hartt; pp. 228-230, Walter Singer; p. 234, Herman Becker; p. 235, Armstrong Nurseries, Ontario, Cal.

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Each place to be visited will be decorated for the holidays in a manner appropriate to its setting.

Unusual gifts and holiday decorations will be on sale at one of the houses. Holiday punch will be served.

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Tickets are available from The New York Botanical Garden Downtown Office, 22 East 60th Street, New York 22, New York. For members of The Garden, $8.00; for non-members, $10.00.

Left. The long vista toward the house. Right. The five-hundred-foot vista from the living room, lined with beds of azaleas and miscellaneous plants.

"BACK ACRES"

By B. Y. Morrison

B. Y. Morrison, who is widely known in American horticulture, was for twenty-five years (1919-1934) Principal Horticulturist in charge of the Division of Plant Exploration and Introduction, Bureau of Plant Industry, United States Department of Agriculture. At the time of his retirement in 1950, he was Director of the United States National Arboretum. Mr. Morrison, one of the early members of the American Horticultural Society, has been editor of its publication, *American Horticultural Magazine,* since its first appearance in 1927; it was then called *National Horticultural Magazine.* This year he was awarded the Peter Barr Memorial Cup, given annually by the Council of the Royal Horticultural Society for work, either scientific or practical, in narcissi. This is the first time an Amercan has received this honor.

In the letter that accompanied the following contribution to these pages, Mr. Morrison wrote: "I have not attempted to list all the species, all the varieties grown here, numberless in azaleas, many in magnolias and camellias, and have made no mention of the huge collection of zephyranthes, which is building up, nor the mass of achimenes I use each year, some outside, some in pots; nor the gloriosas brought to the attention of local gardeners; nor of liriopes—I believe I have all now available in the trade.

"Nor have I said anything about informal plantings along the long, curving entrance drive—of hollies, stewartias, styrax, endless bulbs, and of *Danaë racemosa* as a groundcover. Too soon to know how well it will do as a groundcover, but promising."

TO MOVE ONE'S GARDEN and one's gardening from one climate to another, from one familiar soil to another, from a terrain that gave character to the scene to one that has to be handled with care, is a problem presenting many difficulties and a delightful challenge, particularly if he wishes to continue such of his gardening activities as the new place will admit. Before one has long been in residence, it also proves to be a salutary experience.

In choosing the Mississippi Gulf Coast the inducements, aside from personal reasons, were chiefly the low altitude, the nearness to water, a long frost-free period, and enough winter cold so that I should know when spring comes.

What I did not foresee were the local micro-climates, a soil that would need constant feeding and watering, and the fact that the winter, though mild, would present the hazards of occasional frosts alternating with the mild weather—a problem even more difficult to meet than the hazards of the common early fall frost and the late spring frosts which beset all gardens anywhere. Nor could I adequately foresee the importance of good air circulation, which determines planting masses in such a fashion that the air is not shut off either in summer or winter, and yet allows some curtailment of the movement of too much cold air in winter. To all this, and allied to it, is the use of high shade which will temper the brilliance of summer sun and give shelter to many things which need just that for the perfecting of blooms in winter, and summer.

There was also the factor to be considered of the arrangement of plants that make up not only permanently planted collections, but work areas which would be of no interest to the casual visitor, and could not always be in perfect show condition.

Basically my interest is, and has long been, azaleas and particularly the azaleas that are referred to as evergreen or semi-evergreen. The magnolias are a close secondary interest with camellias as runner-up. The work of breeding azaleas continues without much interruption but with a definite slowing-down of pace as time passes.

Now, after a little more than ten years of growth, the place as a whole has come into enough maturity to show the virtues of the plan, and I have discovered the difficulties of maintenance.

The property is an old farmstead, with a small and quite undistinguished but comfortable house, located in what was once a pecan grove; the fine old trees no longer yield much of a crop, but give a setting. The house and pecans date back some forty years to the time of the father of Ivan Anderson, the owner of the place, with whom I make my home and whose garden I have over-run. The land is almost dead level, but with a little slope to the south so that

there is air drainage in that direction, increased and channeled now by the plantings. The area immediately surrounding the house is the old yard, now dressed with fine lawns of centipede grass and defined by borders of shrubs which include azaleas (many of them trimmed into almost hedge-like character), magnolias, figs, and various evergreen shrubs such as the common myrtle, evergreen viburnum, ternstroemias, bottle-brushes, euryas, cleyaras, gardenias, and some unhappy oleanders which do not get enough full sunlight to do their best. Many of these were planted by Mr. Anderson, whose plant interests overlap my own. Below and in between are the inevitable collections of small things, bulbs for the most part, which make periods of colorful display.

On the whole, however, the garden is a green garden since no attempt is made to have continuous bloom, a program that is as difficult here as elsewhere. The major effects come from the trees with their fine broken shade, the green stretches of lawn, and the evergreen shrub masses.

The next unit area parallels the house yard and is a simple setting of unbroken lawns, from which leads off the major vista from the house windows; a secondary area, with an enclosed shrub planting and the well, the major source of all success in this area; a secondary path for camellias and to right and left the work areas, none of which is visible now from the parts intended for general viewing.

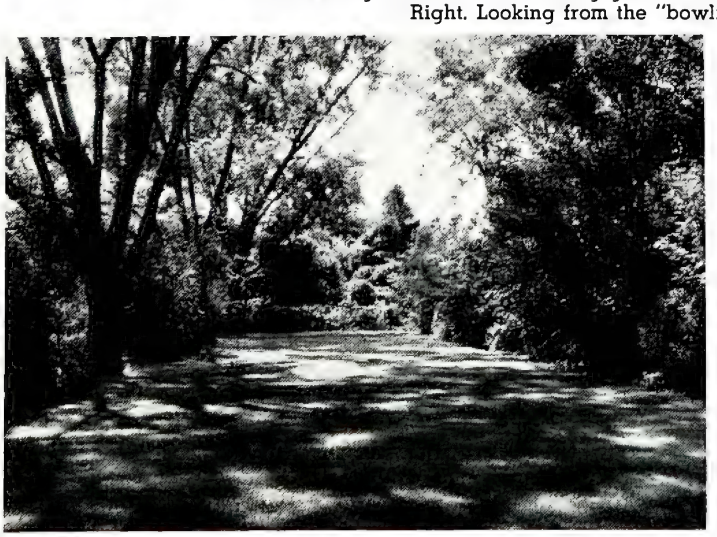
Doubtless because of a feeling that shade is imperative, many southern gardens have too many trees and too close masses of plantings, so that one has little sense of space. With this in mind, the long vista was planned to be seen from the living-room windows and reaches some six hundred feet, ending with a view into pine woods, but no "feature" to stop one's look. It is a long look, long enough to allow the eye to rest. From early autumn to late June, with such intervals in winter as prevent it, this mass of azaleas, with magnolias and camellias alternating along the outer borders, is ablaze with color. No experimental material here, all old things, mostly Glenn Dales, some southern indicas, a few species like the amazing *Rhododendron oldhami,* now over fifteen feet tall, and lit early morning and late afternoon by the sun shining like magic through its copper-haired leaves. The camellias are now old enough and tall enough to show above the azalea masses, but real camellia

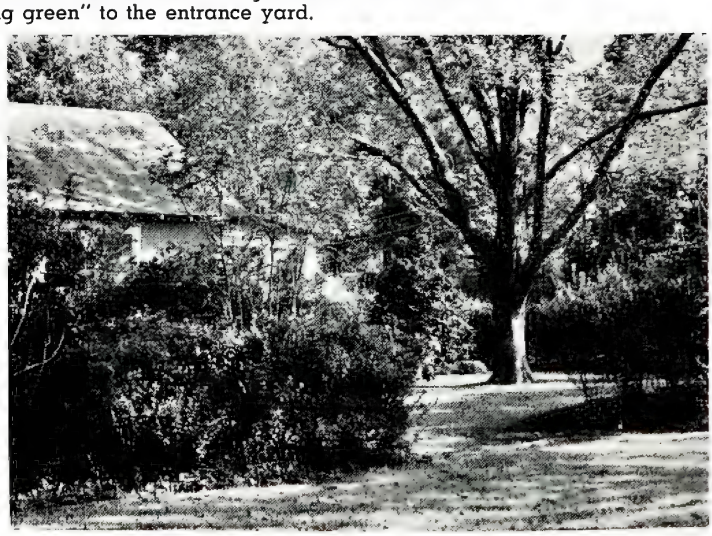
A view from the southwest corner of the house diagonally across the yard into the unit known as the "pump yard"—the pump is beyond the camera's range.

lovers are aghast that they are treated so carelessly that azaleas crowd into them. In early spring, snowflakes, particularly the fine *Leucojum aestivum* 'Gravetye Giant', form a line of green and white, of singular beauty. In late summer, the edges next to the lawn are colorful with masses of lycoris of which there is an increasing number, a minor collection of species and variants, and if the season is propitious, with fine bloom of the Formosan form of the Philippine lily and sheets of torenia, each of which self-sows in wild abandon here. Zephyranthes in lesser number and habranthus add touches of color in season.

The first blooms in these long borders have always been until recently that of the magnolias, with particular interest from the fine specimens of the Yulan in its typical form and in the earlier-blooming form sold on the Coast as *elongata.* At the present time, a trial planting of the Taiwan cherry has been added in the hope that it will make a light shade to cover the azalea blooms, much as dogwood is used to do in the North. These plants are still too young to show whether the plan is successful, but their early production of small rose-colored flowers is very welcome in January, and no frosts of that time seem to bother either bloom or developing shoot, even when other things are damaged.

Left. Looking west on the "bowling green," magnolias and azaleas on right, work area on left.
Right. Looking from the "bowling green" to the entrance yard.





Here, many azaleas start to bloom in August and continue until stopped by frost, with further masses of bloom off and on through the winter until the season is safer in February and March; from that time on, various sorts continue to make a show well into June, with stragglers into July.

These borders annoy visitors who think of azaleas only as compact little cabbage-like plants, for they are allowed free play of growth and in time come into a state of maturity with masses of growth that may be shelflike and dense as boxwood, or open and free as any willow. Now many have reached a height of fifteen to eighteen feet so that the gradations in height can be and are various, with some tall plants well to the front and no attempt at "banking," that stupid arrangement that must often be used when space is limited. In winter, the foliage coloring—bronze, copper, rust, and purplish bronzes, as well as dark green—delights the eye and makes a new pattern again against the grass panel, now cafe au lait color from cold.

The secondary walk, to the west of the main vista beds, is less successful, since with no knowledge of the rates of growth or the ultimate heights, camellias were paired that cannot ever be mates in size or habit.

The path is not without interest, however, as the secondary narrow bed that holds the camellias is used as a trial area for various narcissi, all of which are being tested to see which will succeed in this climate and with our conditions of weather. This segregation also helps the general scheme since the pure yellows of narcissi appear well before the azaleas have passed their earliest displays and so save any color difficulties; pure yellows are difficult to manage with the pastel hues of many azaleas and are too strong for the pure colors of other kinds. There is the added delight to us, on the place, that in the border, in the areas cast between tree shadows, are spots where the sorts of narcissi that enjoy summer baking thrive. Winter brings good bloom on the lovely bulbocodiums that need shelter north and in Britain. The pure white of *N. monophyllus,* the sulphur-yellows of *N. romieuxii* and its kin are delightful. And in autumn there is fine bloom—of the ugly but fascinating green *N. viridiflorus.* As yet there are not enough bulbs of *N. serotinus* and *N. elegans* to know with certainty if they will continue as they have so far.

The old-fashioned greenhouse with high walls hidden by shrub masses of *Raphiolepis indica, Mahonia fortunei,* and others.

The informal entrance area, looking toward the road from the front garden.

The major effects with narcissi must come from the tazetta species, forms, and hybrids, not all of the latter being equally amenable to casual treatment. Starting in winter, before Christmas, Paper-White leads off; and the rest, many of them nameless or of uncertain naming, continue for months. Many have been gotten from old gardens in the South, some from friends who are concerned with them, and many from strangers who have heard of the interest here. It is a field that should interest some young narcissus breeder; for if one may remember Mr. Bowles' statement that the later "poetaz" forms came from fine poeticus varieties bred to tazettas, there must be room for many more kinds than we now have. Add to this the singular charm of such a clone as 'Silver Chimes', a *N. triandrus* × *tazetta* seedling, and the field is immense.

In addition to the tazetta narcissi, all jonquils and all triandrus species and hybrids seem to be permanent and dependable. Even if not yet in masses, which is what they need, the small jonquils yield their anual blooms, all triandrus stay in place with one planting of *N. triandrus albus* permanent more than ten years, and self-sowing, as does *N. jonquilla* itself. Just how successful some of the latest jonquil hybrids will be remains to be seen, as they have not yet been here long enough.

For any other narcissus enthusiast let me record that often the larger-flowered hybrid garden forms will succeed, if one has patience. When I was first importing from England years ago, Mr. Chapman told me that the chances were excellent that I would not succeed with some sorts until some of the offsets on the imported bulbs came into maturity. I did not find this to be the case in the North, but I have here a fair collection of older things that were not successful as first planted, but have now "come back" from their own increase. A few kinds appear to accept us at once, but as yet no pattern is available to suggest why the successful are successful.

The major activity with azaleas has been a breeding program started well before retirement, so that no time would be lost, in which there were two major purposes: a development of double-flowering sorts which would be cold-hardy and, in as wide a range as possible, of the single forms that are basically white-flowered with a colored mar-

(Continued on page 207)

Rosa gallica 'Empress Josephine'.

OLD GARDEN ROSES

By PATRICIA HANRATTY WYSOCKY

After two and a half years with the United States Marines and four years in Panama, Mrs. Wysocky returned to this country in 1949. Since 1950 she and her mother have "engaged in a joint gardening effort on two acres of land on the shores of Lake Minnetonka twenty-five miles west of Minneapolis. We have a man to help us several times a week, but mother and I do all the 'real gardening.' We have about five hundred rose bushes, half of them Old Garden roses, the rest the modern types and varieties. We also have over fifty French lilacs, one hundred and twenty peonies, one hundred irises—varieties, that is, many perennials, tulips, and other spring bulbs, to say nothing of cherries, apples, hazelnut, blueberries, and gooseberries. My five-year-old daughter loves gardening and fishing—she is always helping to dig in order to get worms for her fishing."

Mrs. Wysocky is a member of several horticultural organizations, including the American Rose Society and the Minnesota Horticultural Society, a horticultural judge, a contributor to several publications on gardening topics, and a lecturer to garden clubs in the Twin City and Lake Minnetonka areas.

JUST BECAUSE AN OBJET D'ART is old, it is not necessarily valuable, and so it is with roses. Conversely, because a rose, or other object is old, it does not follow that it is without value. The old roses that are still being grown today are those that have withstood the trials and errors of centuries. They have survived floods and droughts, diseases and pests, heat and cold, and alternate periods of being pampered and of suffering neglect. They're tough, they're patient, they're beautiful. One must admire their fortitude and be a little awed by their history.

The American Rose Society's Committee on Classification designates Old Garden roses as "any type or group developed or believed to have been grown before the introduction of 'La France' (supposedly the first Hybrid Tea) in 1867." Therefore recent developments in Moss, Rugosa, Bourbon, Shrub, and other types are still "old" roses.

Species of the genus *Rosa* are found wild in every part of the globe, from the Arctic Circle to the subtropical regions of northern Africa, India, and Mexico. Fossil specimens of the Oligocene Epoch were discovered in Colorado and Oregon, establishing that roses have been on this continent for at least thirty-two million years.*

Roses were first cultivated, however, in China, western Asia, and northern Africa. There is evidence that these ancient civilizations grew them as long ago as 3,000 B.C. The earliest representation of the rose in Europe is a Minoan fresco at Cnossus, Crete, between 2,000 and 1,600 B.C.; a conventionalized design depicts a yellow rose much like *R. persica.*

About 410 B.C., Herodotus, the Greek historian, noted that roses with sixty petals were grown in the garden of King Midas of Phrygia. About 300 B.C. Theophrastus, "the father of botany," referred to roses in Greece as having as many as one hundred petals. A replica of a rose on the coins of Rhodes of about 325 B.C. lends evidence to the belief that roses were admired and the better types grown in gardens long before history was recorded.

Roses are frequently represented in Egyptian wall paintings and textiles of 300 B.C. Royalty in Egypt during the Ptolemy dynasty became very "rose conscious." Cleopatra also used the rose extensively in Egyptian ceremonials, and for a while the rose even replaced the lotus in favor.

An Abyssinian form of *Rosa gallica (R. gallica* var. *richardii)* has been found in tombs dating from the first to the fifth centuries A.D. Commerce between Abyssinnia and Egypt, by way of Arabia, had been established for several centuries; Egypt became the rose-supplying nation of the ancient Mediterranean World, shipping roses as far as Rome. How did the flowers remain fresh on the long sea voyage? No one has discovered this secret.

In ancient Rome, as in Egypt, rose petals were used lavishly at banquets, over couches and as carpeting—to a depth of eighteen inches as carpeting on one occasion. They were used in making jams and jellies, candies and wines, and as remedies for many ailments, including over-indulgence, as safeguards against infection, and even as cures for supposedly fatal diseases.

Pliny, the Roman naturalist who lived 23-79 A.D., mentioned *Rosa alba, R. canina, R. centifolia, R. damascena,* and *R. gallica* in his *Natural History.* There is doubt that his *R. centifolia* is the rose that we know today as *R. centifolia* L. The latter is not a wild species, but a complex hybrid of several species.

After the fall of the Roman Empire, the church discouraged using the rose as a religious symbol because of its long association with Roman conviviality. But this opposition was overcome, and the rose became an emblem of Christianity.

Between the fall of the Roman Empire and the Arab invasion of Europe, a number of varieties were lost. The Arabs, who had developed a liking for roses after their conquest of Persia, brought species from the different parts of their vast empire to Europe, including *R. foetida, R. foetida* var. *bicolor,* and *R. moschata.* Some of these roses did not survive, for one reason or another, and were "temporarily lost."

King Edward I (1272-1307) was the first English sovereign to choose the rose as his emblem. Since then it has

*Herman F. Becker: Roses of the Past, **The Garden Journal**, May-June, 1962.

Rosa damascena bifera.

been a prominent device of English heraldry. It came into particular prominence during the disastrous civil war betwen the House of York and the House of Lancaster (1455-1458), when a white rose represented York and a red rose Lancaster. The rose called York and Lancaster, *Rosa damascena* var. *versicolor,* played no part in that struggle, although there are many stories that would lead one to believe so. Actually, the York and Lancaster rose was not known in England before the beginning of the seventeenth century. It was first described by Monardes in 1551 and is considered to be a sport of *R. damascena.*

It was not until the latter half of the sixtenth century that fairly accurate, reliable information on rose species and varieties began to appear. The descriptions were of their medicinal virtues rather than their botanical or horticultural characteristics, and this is understandable, since for centuries the cultivation of roses in Europe was largely for the medicinal properties of their flowers and fruit, some being grown in monosteries for their religious symbolism. (It is known today that rose fruits, or hips, have a vitamin-C content four hundred per cent greater than that of oranges.) Attar of roses and rose water, which was used in perfumes and in flavoring, were very important, too. The free fruiting of *R. canina* and of *R. gallica* and the fragrance of *R. damascena* made them the most popular roses of the period.

The most comprehensive work on roses was issued in three magnificent volumes between 1817-1824. *Les Roses,* with exquisite portraits by Pierre Joseph Redouté and text by Claude Antoine Thory, marks the beginning of our understanding and appreciation of the rose. Redouté was commissioned to perform the task of portraying all the then known roses by the Empress Josephine, who stimulated interest in growing and hybridizing these plants. Her famous garden at La Malmaison contained every known rose of her day, about two hundred and fifty species and varieties. Generals of Napoleon's armies shipped many roses from conquered countries to La Malmaison, and captured ships were searched for seeds and plants for Empress Josephine's garden. Two American species, *R. carolina* and *R. setigera,* were planted at La Malmaison through the courtesy of French missionaries in Canada.

In our garden at Lake Minnetonka, we are growing over one hundred kinds of Old Garden roses. These include species, varieties, and hybrids. Most of them are recurrent–blooming, a few are spring-blooming only, and the rest are ever–blooming. Some are fragrant, some are without fragrance. Fragrance varies with soil and climate, even with the time of day. Contrary to general opinion, all old roses are not fragrant.

We grow the roses that bloom only in spring for two reasons: 1) When we started our collection, we thought all old roses bloomed only in that season in our climate, and so we paid no attention to catalog statements on the "ever–blooming" qualities of some varieties. 2) Some of the "spring only" roses are so spectacular when in bloom and make such attractive foliage shrubs when not in bloom that we do not want to be without them. Some of the spring-blooming varieties that we consider worthy of space in a shrub border are: 'Frühlingsgold' or 'Spring Gold' (1937); Austrian Copper (*Rosa foetida bicolor*), introduced before 1590, a legacy from the Arab invasion of Europe; 'Mme. Hardy' (1832); 'Agnes' (1900); 'Cardinal Richelieu' (1840); 'Captaine Basroger' (1890); 'Alice Vena'; the Provence rose (*R. centifolia L.*); and 'Blue Boy' (1958).

The terms recurrent–blooming and everblooming are sometimes difficult to differentiate, but some varieties are literally covered with blooms from early June to hard frost—usually in late October here. Of the everbloomers 'Belinda' (Hybrid Musk, 1936) is the most outstanding in our garden. 'Skyrocket' ('Wilhelm', Hybrid Musk, 1934) is not as full a bush, but it is continually in bloom. We are presently growing several Kordesii Hybrids which look promising; 'Dortmund', 'Leverkusen', and 'Raymond Chenault' are doing very well for us. Kordesii Hybrids resulted from open-pollinated seeds of the usually sterile 'Max Graf' (*R. rugosa* × *R. wichuraiana*). Another Kordes rose (it is not a Kordesii Hybrid) which we like, is 'Kassel', a truly beautiful large-flowered climber which bears its blooms on new wood. 'Blanc Double de Coubert' (1893) is a lovely white Hybrid Rugosa; the bush always carries some blooms but is not covered with them. 'Delicata' and 'Frau Dagmar

Rose 'Belinda', a Hybrid Musk.

Hartopp', both Hybrid Rugosas, are always in bloom. 'Delicata' is excellent for a problem spot, for it does not like pampering; only the old wood needs to be cut back. (Most of the old roses should have the old wood cut back every third year. A good method is to cut back one-third of the old canes each year, rather than cutting all the old wood at one time. In this way the bush never has a chopped-off appearance.) Our favorite 'Frau Dagmar Hartopp' is a beautiful newcomer to the Rugosa group. It has glossy rugose foliage; vigorous growth, bushy and not too tall or rangy; large, single, bright pink flowers with a delicious fragrance; and hips as large as crab-apples.

Of the recurrent bloomers, 'Salet' (1845), a pink Moss rose, never fails. 'Stanwell Perpetual' (1832) forms a beautiful ferny-leaved bush, its branches gracefully arched with fragrant blush to white flowers. *R. damascena semperflorens* or *bifera* is the "Four Seasons Rose" that is mentioned by the classical writers of ancient Greece. We are delighted that it usually blooms in our garden in the summer. 'Will Scarlet' (1948) attracts attention with its clusters of fragrant, cherry-red, semi-double flowers. 'Nymphenberg' (1954) is fragrant, too, and blooms almost all season. Its large, double, salmon-pink flowers are borne in clusters on a shapely bush with very shiny foliage. 'Mrs. John Laing', (1887), 'Paul Neyron' (1869), and 'Georg Ahrends' (1910) are Hybrid Perpetuals which really are perpetual and far outbloom the famous 'Frau Karl Druschke' (1901) in our garden. 'Henry Nevard' (1924) is another Hybrid Perpetual that should be far more widely grown.

These and many others give us pleasure during the blooming season, but we must add that they give us increased joy in the fall, since they require no special winter protection in our garden. We mulch (preferably with alfalfa hay to a depth of six inches) in the summer and let that remain over winter. In spring we add more alfalfa hay to bring the mulch up to six inches again. We fertilize in early spring with "Turfbuilder," or another high nitrogen

Rose 'Souvenir de la Malmaison'.

fertilizer that is safe to apply to lawns, and in early July with mineralized "Loma." We use no additional fertilizer, but water well, giving the roses a thorough soaking about twice a month until the end of August. After the first of September, we let nature take over, and we do not resume watering until October. Then we again water thoroughly, even if the fall has been wet. In this climate watering in October does not stimulate new growth, which is tender and therefore undesirable, but it does saturate the soil around the roots and prevents drying-up from prolonged freezing. This is often the reason why roses fail to survive the winter in cold climates. Some of the varieties that we grow will winter over in entirety, leafing out to the very tips even after the temperature has fallen to 40° below 0° on some mornings. Others will tip-kill, others cane-kill to the level of the mulch or to snow line; but all are vigorous, and we grow only those that bloom on new wood.

The Austrian Copper rose (*Rosa foetida bicolor*).

After the October watering, we forget our roses until spring, when our irises bloom and the first of our Old Garden roses join them. The last roses vie for attention with our chrysanthemums.

Plants of these old types that are purchased in the United States are grafted on other rootsock, so the formerly common problem of suckering from own roots is almost entirely eliminated. Occasionally a bush will sucker, but this is the exception and not the general habit of growth.

Some old roses are sensitive to spray chemicals just as are some of the modern roses. We do spray our old roses, but not frequently and not heavily. They are fairly disease-resistant—a few are disease-susceptible; but aphids, thrips, and red spider do attack them. However, we do not worry too much about diseases and pests, for these rose types survived for centuries before modern chemists concocted potions for the aid of gardeners. Old Garden roses are tough and patient.

The soil in our garden is heavy "Minnetonka clay-gumbo." The addition of humus is essential, if not for our plants, for our own well-being. It is almost impossible to work the soil without incorporating humus. Any decaying matter, vegetable or animal, will do, but our finest results have come from the addition of leaves—quantities of them. In sandy soil, the problem is reversed; then large quantities of organic material are necessary to retain moisture and build up fertility. The summer mulch of alfalfa hay, or other mulching material, retains moisture and, even better, controls weeds. Old Garden roses will survive in almost any type of soil, but adding humus, providing good drainage, mulching, and watering naturally increase the productivity of our plants and our pleasure in them.

I have mentioned that Old Garden roses are patient. Now it is time for me to say, "Be patient with Old Garden roses." Some will bloom the first year, most will bloom the second or third year, a few will not bloom for as much as four years. These roses take time to establish their roots and to produce flowering wood. They need time to become acclimated to their new location.

We are happy that Old Garden roses tolerate, even reward generously our efforts to grow them with the least possible effort. And we are grateful to the many generations of gardeners, who passed before our day, for preserving these very special members of the rose family for us. They are not the brilliantly colored Hybrid Teas, the Floribundas, the Grandifloras of today's gardens. Their attraction is more subtle—all the "attraction that sentiment, history, botany, association can lend them," and "they are an acquired taste," as J. S. Thomas remarks in *Old Shrub Roses.* But the number of their admirers in this country and in many other countries is increasing.

If any readers of *The Garden Journal* are interested in the Old Garden roses mentioned in this article, or other old roses, the American Rose Society, 4048 Roselea Place, Columbus 14, Ohio, has information on sources from which they may be obtained.

'Salet', a pink Moss rose.

"BACK ACRES" (Continued from page 203)

gin. There has been considerable success with both. There proved to be little difficulty in getting double flowers, though most are midseason and late in blooming times. Their great advantage over the charming things such as the old *Rhododendron balsamineaflorum* (or *R. roseaflorum*) is that they are not so slow in growth, though many continue to hold a relatively low stature and none shows promise of fifteen-foot height, even in some future maturity. The white-eyed kinds are more difficult, since the character that controls the white eye is variable, and a plant does not always produce flowers with white eyes on all branches nor all the time, two variations that could plague any nurseryman. They are so distinct, however, that they seem well worth the effort, and they are apparently much cold-hardier than their Japanese satsuki ancestors, such as 'Rowgetsu' or even 'Shin'nyo-no-tsuki'.

As a purely personal pleasure and to satisfy curiosity, I have built up a collection of Japanese satsuki azaleas, some from the old collection that I was instrumental in bringing in to the United States Department of Agriculture in 1938-39 and others that Dr. John Creech has introduced more recently. These have been added to by several years of continuing importation directly from Japan, with the usual losses and successes that attend all importations of plants that must come in bare-rooted. These plants have not yet been here long enough to show mature characteristics, but there is already evidence enough to report that they are not all dwarfs, nor likely to be. In addition, not all are late in their flowering season, though all show a tendency to late bloom that is very welcome here. The one difficulty is that the gardener must take care that the plants never lack for water, since fine blooms even in semi-shade will wilt in dry soil.

I have no intention of starting in to train any as bonsai, although this is their usual treatment in Japan, and is often the work of old men! I find that time is passing, and some days I begin to feel as though I should be like the old man in Japan who collected the Kurume azaleas for his personal pleasure and never lived to see the day when they would be discovered by Wilson and turned into standard items of American trade, especially in the more easily grown and less lovely clones.

If I were to be asked what are the major difficulties here, I should have to confess that the maintenance of fertility levels in sandy soil is a labor; that watering can become an acute problem in periods of drought, which do come; that one misses more than anything else the close association with many persons who are equally concerned about plants, particularly in discovering what will and will not thrive here, besides the routine things that everyone has and has had since before the wars.

If, on the other hand, one has an adventurous spirit, he has a seemingly almost unoccupied field in which to experiment with many sorts of plants, to learn first-hand about much that he knew only from books or as greenhouse material, and in time to come to know many wonderful gardeners new to him, each working in his own field even if not neighbors across the fence.

"ILLUSIONS OF UNDERSTANDING"

Dr. René Dubos, well-known author and lecturer, is a member of the faculty of Rockefeller Institute in New York City. His latest book, *The Dreams of Reason: Science and Utopias,* 1961, is based on the lectures that he delivered at Brookhaven National Laboratory as the second series of the annual George B. Pegram Lectureship.

The following, taken from the chapter on "Illusions of Understanding" in the above-named book, is reprinted with the permission of the publisher, Columbia University Press.

"THE PERENNIAL FASCINATION of Greek philosophy lies in its concern with the kind of knowledge that led man out of his brutish existence. Science would be just an instrument for comfort and power, not a cultural force, if it did not help man to transcend his animal origin. . . . Ideally, and to a large extent actually, science is part of the collective effort for the humanization of mankind.

"Modern science has been immensely successful in discovering facts and inventing techniques. As Francis Bacon predicted in the *Novum Organum* and as Ortega y Gasset scornfully emphasized in *The Revolt of the Masses,* even mediocre minds can make scientific discoveries. Only a few minds in each generation have been able to perceive the laws of the cosmos and to communicate them in a meaningful form to their less gifted fellow men. As to understanding the nature of the universe and of the human condition, it is questionable whether we have progressed much during the past two thousand years. The most that can be said, perhaps, is that science has helped mankind to dispel errors and overcome fears and, in addition, has increased human awareness of the immensity and complexity of the cosmos.

" . . I regard as one of the most important contributions of modern science to philosophy—the doctrine of the chemical unity of life.

"It has been found that all living things—whatever their size and whether they be men, animals, plants, or microbes —possess many physiochemical characteristics in common. In particular, all depend upon the same fundamental reactions for their supply of energy; all synthesize proteins of approximately the same amino acid composition for structural purposes, and for enzymatic activity; all transfer their hereditary endowment from cell to cell through the agency of submicroscopic particles consisting largely of nucleic acids. These physiochemical similarities provide, of course, spectacular confirmatory evidence for the theory of evolution. They greatly increase the likelihood that all living forms studied so far had a common origin. Starting from a single point of genesis, organisms have progressively differentiated, but have retained the most fundamental characteristics associated with life at its beginnings.

"The chemical unity of life is compatible with two different working hypotheses. One is that some unknown principle runs like a continuous thread through all living forms and governs the organization of their physiochemical properties. The other is that there is no such principle and that forces known to operate in the inanimate world are sufficient to account for all characteristics of life. The second hypothesis . . is now the more generally accepted, because it is economical of thought and also because biological phenomena have been found to go hand in hand with physiochemical reactions. In reality, however, the fact that these phenomena do not contradict known physiochemical laws is not sufficient evidence to prove that life is merely an expression of these laws . .

"It is apparent, furthermore, that living processes differ in many fundamental ways from what is known of the inanimate world. For example, whereas an increase in entropy is expected in all inert systems, living things produce and maintain order from the components of the inanimate world, and this property disappears at the very moment life ceases. Or again, living things possess the property of duplicating themselves and at the same time of undergoing changes which they can also replicate; nothing of the sort is known in the inanimate world . . .

". . assembling a self-duplicating system from complex molecules known to be present in systems which are living and therefore self-duplicating would prove that man—himself a living thing—can reconstitute some of the mechanisms which he has found to be associated with the living objects that he knows. Important as this achievement would be, it would not settle the question of the *origin* of life. In this regard it is interesting to note that most of the authors who have formulated hypotheses to explain how life *first* emerged from matter have assumed that the initial reactions which could be regarded as having some similarity to the living process occurred, not in nucleic acids or proteins, but in simpler and more primitive molecules. Only progressively in the course of aeons would the machinery of life have become transformed into the very

complex apparatus that we know today. If it has any meaning at all in the terms of our present scientific philosophy —which is questionable—the origin of life must therefore be sought in processes unlike those formed in the highly evolved living things that have survived and that we know.

"Life has many properties which are at least as interesting, and as puzzling, as the ability of living things to reproduce themselves . . .

"the understanding of life will remain an illusion as long as one cannot account for the origin of reactions and types of behavior found only in living things.

". . . there exist in living things potentialities that become manifest only under very special conditions. The phenomena of symbiotic relationship reveal how these potentialities can generate reactions which have large creative effects—as illustrated in the two following examples.

"Small and frail as they appear to the untrained eye, lichens are in many ways among the most successful living things. They occur in many intriguing forms, with a wide range of colors, on the bark of trees, on rocks, and on waste lands. One of their characteristics is their ability to become established and to prosper under the most inimical conditions, even in places where life appears all but impossible. They are the first living things that develop on bare rocks, and they are abundant even in the most desolate areas of the Antarctic.

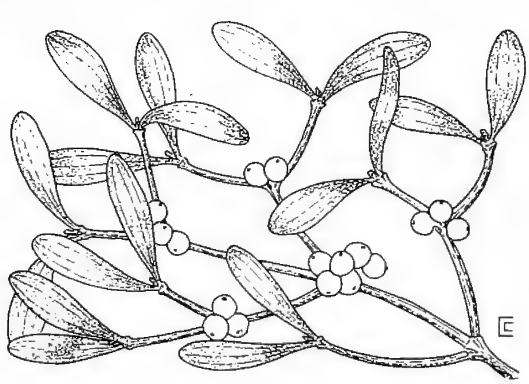
"What makes lichens so important for our discussion is that they are made up of two different microorganisms living in intimate association. In fact, the word "symbiosis," which means "life together," was invented to refer to the kind of biological association found in lichens. Each lichen is the symbiotic summation of one species of alga and one species of fungus, the two organisms being so intimately interwoven that it is extremely difficult to separate them. There is no doubt that the alga and the fungus supplement each other nutritionally when they are associated in the form of a lichen. The alga produces chlorophyll and is therefore capable of manufacturing carbohydrates from the carbon dioxide of the air by photosynthesis. The fungus feeds on these carbohydrates, and in exchange it extracts from the environment certain minerals which are used by the alga; furthermore, the fungus acts as a reservoir of moisture. Although these interrelationships have not yet been worked out in detail, it is clear that they are of advantage to both members of the partnership. In any case, it is certain that lichens can multiply where nothing else will grow and can survive under conditions that seem incompatible with the survival of other living things.

"The root nodules of leguminous plants constitute another striking example of symbiosis. These nodules are produced by the response of the plant to the presence of special kinds of bacteria called *Rhizobium*. Although these bacteria become established on the rootlets and multiply in certain cells, normally they do not invade the rest of the plant. Leguminous plants can exist without root nodules in the absence of *Rhizobium* bacteria, but usually grow better when associated with them, particularly in soils deficient in nitrogen. The root nodule bacteria can fix gaseous nitrogen from the air and convert it into organic nitrogenous compounds that can be utilized by the plant. In exchange, the plant supplies the bacteria with other nutrients necessary for their growth. The partnership, therefore, is beneficial to both partners; it constitutes a true symbiosis between plants and bacteria.

"The nutritional aspects of symbiosis have been the most extensively studied, because nutrition is a factor of such obvious importance for survival and for growth and, moreover, one that can be readily analyzed. It is certain, however, that symbiosis often has other effects of greater biological interest. Thus, lichens exhibit complex morphological structures and synthesize peculiar organic acids and pigments that neither the alga nor the fungus can produce alone. Looking at the delicately shaped and bright red structures of the common lichen known as "British soldier," it is difficult to believe that such startlingly beautiful forms can result from the association of a microscopic alga and a microscopic fungus, both of them inconspicuous. Nor would it have been possible to predict from the known characters of its two components that the lichen could synthesize the peculiar chemical substances that it produces, or exhibit such great ability to survive heat, cold, or dryness.

"The association of the leguminous plants with *Rhizobium* provides another astonishing example of the creative effects of symbiosis. The root nodules contain a red pigment which is almost identical with the hemoglobin of red blood cells! This form of hemoglobin cannot be produced by the bacterium or by the plant alone, nor, for that matter, is it known to occur anywhere else in the plant world. It seems to be formed only in the plant cells which harbor the *Rhizobium*. Thus, it is clear that symbiosis is more than an additive association; it is a creative force which can result in the production of unpredictable new structures, functions, and properties.

"One could quote many other examples of biological phenomena not predictable from the knowledge of forces usually studied. Such are the biological cycles which reveal dramatically how intimately all organisms are related to the diurnal or annual movements of the earth or to the phases of the moon; the profound effects of latitude, as well as of winds and weather, on physical well-being and on behavior; also perhaps some of the odd claims of parapsychical research. I mention these facts not as an appeal to magic but merely to emphasize that there exist in heaven and earth more things than appear in present-day scientific philosophies. To acknowledge ignorance of these important matters is, in my opinion, not a retreat from reason but instead the most constructive way to broaden and deepen the scientific approach to the understanding of life."



PAULOWNIAS
IN THE LIFE OF THE PEOPLE IN CHINA AND JAPAN

By SHIU-YING HU

Dr. Hu is a member of the staff of the Arnold Arboretum of Harvard University. The following has been adapted from part of her contribution. "The Economic Botany of the Paulownias," in *Economic Botany,* published quarterly by The New York Botanical Garden for The Society for Economic Botany.

ON ONE BRIGHT MORNING IN MAY, as I passed a small church in Kingston, New Jersey, I suddenly caught the unexpected sight of a fully blooming paulownia in its backyard, and was astounded by the sheer beauty of the tree. The large, globose mass of soft color, a light lavender, against the blue sky behind a quiet country church was a matchless scene of transient glory.

The paulownias were introduced to America for ornamental purposes, probably from Europe about 1844. They rapidly rose to wide popularity. Praise of the rare beauty of the flowering tree can be found in the horticultural and botanical magazines of that period. At first the enthusiasts for exotics eagerly paid three to six guineas for each plant. By 1847 American nurserymen had learned the secret of propagating the species by root cuttings; Andrew Jackson Downing, first landscape architect in this country, wrote in that year that any little piece of the root can produce a plant. This method of propagation caused a steep drop in the price of young plants, and one could purchase an individual plant for from thirty to sixty cents.

Within a period of twenty years, the paulownias became widespread in gardens in eastern North America, and could be found from Montreal to Louisiana. However, the dull mess of persistent fruits, which overwinter on the tree, was not appealing to some growers, and paulownias have never become as prominent in American landscapes as have forsythias and spiraeas and day-lilies in the North, and pyracanthas and crape-myrtles in the South.

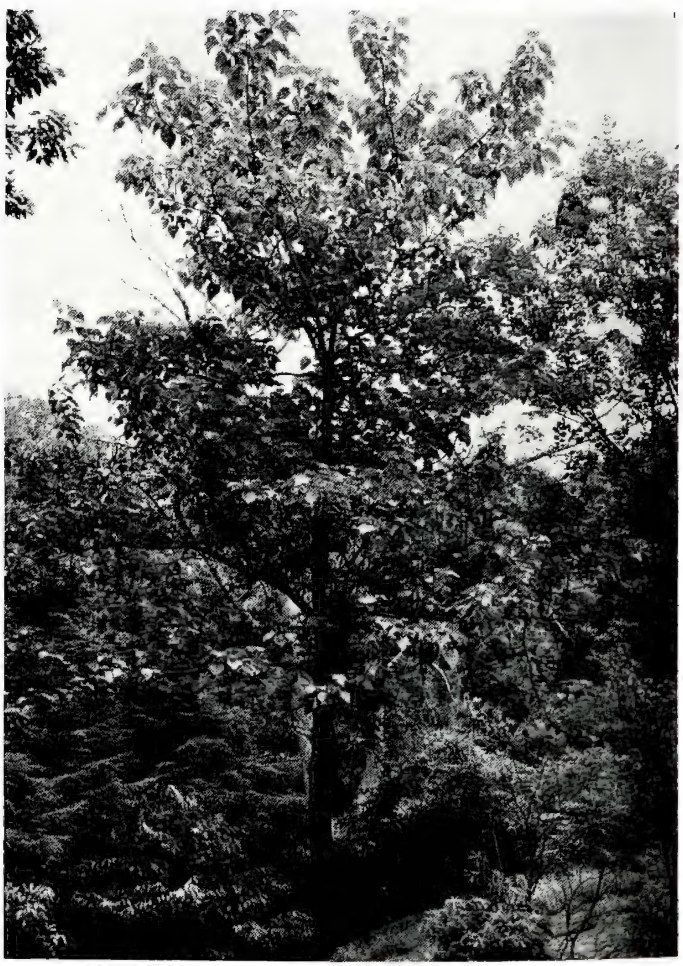
In the Far East the story is very different. There the paulownias attained widespread popularity and have maintained it throughout the ages. In China and Japan people have been attracted, as in Europe and America, by the fully blooming tree and have used them extensively for roadside planting. Moreover, they advanced one step beyond their aesthetic appreciation of the tree; they discovered the special characteristics of the wood and used it in the construction of houses and in the manufacture of household articles, musical instruments, temple wares, and medicines. In other words, the paulownias not only entered the landscape of the Orient, but they have also been woven into the complicated pattern of the cultural and economic life of the people.

Our knowledge of the role of the paulownias in the life of the people in eastern Asia, the native habitat of the species, is drawn from present-day observations and ancient records.

The earliest record is found in *Erh-ya,* the first Chinese encyclopedia on natural and cultural objects. Traditionally, the authorship of this book is attributed to Chou Kung, the Duke of Chou and son of the first ruler of the Chou Dynasty (1122-255 B.C.) Many historians believe that *Erh-ya* was prepared in the late Chou period. Although the authorship and date of publication cannot be ascertained, we can be certain of one thing about the book. *Erh-ya* represents the only existing Chinese record in which the ancient people transformed the prehistoric word-of-mouth knowledge of the natural history in their environment into a written historical record. In article fourteen, the term *Yung-tung-mu* (glorious paulownia wood) appears among a list of useful woody plants. This indicates that long before the Christian era the paulownias had entered the aesthetic and the economic life of the Chinese people, who had described the flowering tree as "glorious" and had found the wood useful.

A conventional legend among the Chinese people portrays the paulownias as the only tree on which the phoenix perches. It is further believed that the phoenix never appears before the people unless a benevolent ruler takes

Paulownia tomentosa.



command of the land. This phoenix is said to be an auspicious bird which lights only on the best kind of tree, and the paulownia meets the requirements. As a good omen, the paulownia is extensively planted.

Except for the last fifty years, the Chinese intelligentsia have been under the influence of the teachings of Confucius. In this school of thought, the highest attainment for an educated person is to become a *chun-tzu,* a man of complete virtue. Meanwhile, the educated Chinese had a profound knowledge of the paulownia. They knew that when a paulownia tree is alive, the wood is soft and brittle and resists no axe. When the tree is dead, its timber becomes firm and strong; it does not crack in drying nor decay in soaking. For tenderness of heart and stability of character, the paulownia is an emblem of *chun-tzu.* Consequently, a garden with paulownias is always regarded as a gathering place for the Chinese intelligentsia, who may drink to their mutual health and compose poems for each other.

The natural habitat of the paulownia is the open marginal area of the mesophytic forest of the temperate zone. In China the forests in the flood plains, alluvial fans, and gentle slopes of the zone have long been exterminated because of the ever increasing demand of land for agriculture. The forests were destroyed through burning, a technique practiced since time immemorial by all the tribes living in China and still continuing in the mountainous regions throughout the country, but especially in southern and western China. Because of the ruthless burning of the forests in arable areas, a spontaneous growth of paulownia cannot be found except on steep slopes of out-of-reach mountainous areas.

Since the dawn of the historical era in China, the Taoist monks have retreated to the scenic spots of the less inhabitable areas. Later, Buddhism was introduced into China and became popularized in the Tang Dynasty. Some Buddhist temples were also established in such localities. The monks, especially the Taoists, live very close to the land and have intimate knowledge of the natural history of their regions.

From observations with cultivated paulownias, we know that when a young tree is not properly pruned, the small dead branches may introduce a decaying fungus into the pith of the trunk of the living tree and cause heart rot. As the tree grows in girth, the rot increases. When such a tree is felled, and the wood is dried spontaneously in the air, the rot stops spontaneously. This condition sometimes occurs in nature. A hollow paulownia trunk was once discovered by a monk who had a natural gift of imagination and artistry. He roughly carved the bark into the shape of a fish and had it hung inside the yard of the temple. It is customary for all monks to rise for morning prayers when the cocks crow; and eventually this first wooden fish became the morning bell in the temple, for a deep thunderlike sound can be produced when the fish is beaten by a strong stick. In the Chinese language the sound of the characters for fish and abundance are homonyms. It is a Chinese custom to use a fish figure in objects of art to express good wishes for an abundant life with boundless blessings. Incidentally, the pattern of hanging a wooden paulownia fish inside the temple gate has been copied among the religious institutions, and the beating of the wooden fish for daily prayers has become a time-honored custom in temples.

A seedling *Paulownia tomentosa* on the grounds of The New York Botanical Garden.

When Siebold and Zuccarini proposed the generic name *Paulownia* in 1835, they commented: "We have taken the liberty of naming this new genus *Paulownia* for the form Kiri which has been taken as a *Bignonia* to render homage to her Imperial and Royal Highness, the hereditary Princess of The Netherlands . . . It is not only for the beauty of the plant, but also for the reason that the leaves with three stems of flowers have served as the coat of arms of the celebrated hero, Taikasama, that the Kiri is very much honored in Japan."

A more recent incident illustrates that the paulownia has as prominent a place in Japanese culture today as it had two hundred years ago. On June 21, 1960, the Japanese Consul General in New York City, Mitsuo Tanaka, presented an insigne of the grand cordon of the Order of the Rising Sun with paulownia flowers to General Douglas MacArthur to honor him. This represents the highest decoration Japan can confer on a foreigner who is not a head of state.

The Chinese employ paulownia wood, which is light and strong, in making chests. In southern China where the people prefer clogs to shoes, the wood is used in making this kind of footwear. Many of the wooden wares—rice pots, bowls, and spoons—used by monks in the Buddhist monasteries are carved from paulownia wood.

A majority of the Chinese depend upon traditional medicine whereby doctors prescribe plant or animal materials and minerals for the cure of diseases, the restoration of

(Continued on page 216)

TYPE HUNTING IN EUROPE

By RUPERT C. BARNEBY

Mr. Barneby is Honorary Curator of Western American Botany at The New York Botanical Garden. He is an outstanding student of the flora of western America, particularly of *Astragalus*. He now has ready for publication his Atlas of North American *Astragalus*, the culmination of more than twenty years of research and study on this enormous and very difficult group.

BY AN ACCIDENT OF HISTORY the first naturalists in America were Europeans, and inevitably they carried out or sent their collections of animal and bird skins, of insects and plants and geological specimens back to the capitals of western Europe. Until early in the nineteenth century America possessed no facilities for study of what were termed in those days its "natural productions," and there were only a few rare persons with the specialized knowledge necessary for their appreciation. As a consequence the museums of France and England, of Germany and Spain and Italy, contain the materials upon which the early texts dealing with American fauna and flora were based, and it is often necessary to go back to these primary sources to understand the identity, and hence the nomenclature, of organisms first described in the pioneer days. Sooner or later almost every one who has worked in the field of American taxonomic botany develops what might be called the European itch. Finding it impossible to identify a species of plant from a sketchy description which may have been, at the time of writing, amply sufficient for its purpose, he finds himself compelled to set forth on a search for the original specimens from which the description was prepared. For a number of years I have been carrying around with me, in connection with studies of North American *Leguminosae,* the classic symptom of the European itch, a list of problems which could not be solved in any American herbarium. The greater number of these problems concerned the types that figured in the title to this article; but before I pass on to the subject of my travels (or cure), it may be helpful to set forth something of the special meaning that the term *type* has acquired in botany and other branches of natural history.

By international agreement, the type of a species (or subdivision of it, such as variety) is generally a particular specimen with which a particular name is permanently associated. Theoretically at least, every Latin name that has been applied to any sort of plant since the publication of Linnaeus' *Species Plantarum* in 1753 is indissolubly wed to a tangible reality in the shape of a type-specimen. This type-specimen serves as a standard of comparison in much the same way that a platinum rod buried in a London vault may serve as standard for a metric foot. The purpose of the type-method is a settled nomenclature, understandable to the peoples of all nations and of universal application. In principle it is necessary only to identify the type, and the name automatically follows. Now it might be thought that since types are limited in numbers (even though, in fact, very numerous) and presumably recognized without difficulty, all would have been identified finally and permanently long ago. But this is not the case, and there are three reasons why the task is not only far from complete at present, but may never be so. In the first place, taxonomy is not a static science. As more is learned of any group of organisms, a more exact and refined view of their structures and relationships finds expression in a modified classification and hence a modified nomenclature. For example, where botanists had, perhaps, a single variable species fifty years ago, we can now recognize two or more perfectly distinct ones, each requiring its own name. The name formerly applied to the aggregate must be assigned to one (and only one) of its newly recognized parts. In order to determine which part deserves the old name, it may be necessary to redetermine the identity of its type in the light of the newly acquired knowledge. In the second place, surprising as it may seem, not all types have yet been examined by a botanist capable of determining the identity of the specimen; and even where this has occurred, mistakes can be and often are made. Thus a review of types is standard procedure in the revision of any group of plants. The third reason for examining types lies in their own nature, which is much more complex than at first appears.

Ideally a type is a single specimen or sheet of specimens all similar in character, associated with a label bearing data on locality, collector, serial number, and date identical with those given in the original printed description. Ideally this specimen will be found under its rightful name (or a readily learned synonym) in a museum that can be inferred from the circumstances of the publication; and it will bear an annotation, signed or initialed by the author of the name, testifying to its authenticity. In practice all these conditions are comparatively seldom met in any given case, especially when the date of publication goes back a hundred years or more. The connoisseur of types learns to expect and to recognize many sorts of difficulties and obstacles in his search. Types have been burned, mislaid, transferred from one collection to another (when they turn up in unexplained and unexpected places), or even stolen; when located they may prove inadequate for their purpose or reduced by insects to a thimbleful of dust. Very often an author described his species from several collections, and if he did not designate a type (and the old botanists never did, for the type-method itself is a modern invention), a choice must be made from among the specimens he is known or believed to have seen. Sometimes species were based not on specimens, but on pictures of plants, which may become types, or even upon hearsay, a situation with which the type-method is not designed to deal. The most frequent and vexatious obstacles to recognizing types are the incomplete or actually misleading labels associated with them. Until about seventy years ago the labeling of plant specimens was a haphazard process; if details of a plant's provenance were published, they were seldom transcribed onto a label, or if so, only in abbreviated or altered form. Many types bear only a Latin name, with no further infor-

mation, and these can sometimes be identified only by a knowledge of ancient handwriting, a highly specialized branch of learning. Yet others have no labels at all, or the data may be reduced to a Greek letter or other enigmatic symbol.

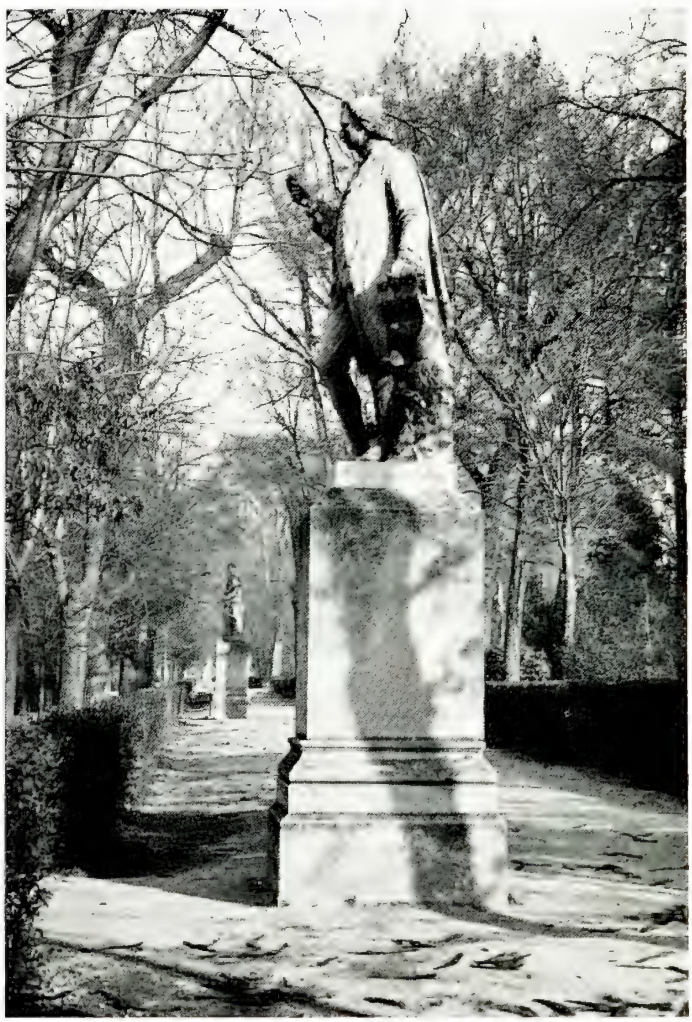
The interpretation of types is in itself a minor science and has acquired its own little vocabulary or jargon. There is the type itself, or holotype. There is the isotype, a specimen duplicating the holotype (it may be a stem from the same plant, or a plant collected at the same time and place) but mounted separately. Often the isotype is equivalent in practical value to the holotype, but because of human frailty duplicate labels are not inevitably associated with duplicate specimens, and the assumption that an isotype is authentic for a given name can lead to grave misunderstandings. There are also cotypes or syntypes, with a particular shade of meaning, and for the student of petty larceny in temples of high endeavor the miserable kleptotype (from Greek *kleptein,* to steal), a fragment of holotype surreptitiously removed from its proper home.

But still, you may object, why go to Europe for types; cannot types come to America? It is true that plant specimens are crossing the Atlantic almost constantly as loans between museums, but types are unique and irreplaceable, often old and fragile, and should not be subjected to the hazards of travel except in emergency. Moreover some collections, of particular age and value, such as that of Linnaeus, are never loaned under any circumstances. In order to get around this obstacle many historic types (and other specimens) have been photographed and the copies widely distributed among herbaria, and these are often helpful. Nevertheless a photograph often fails to show the more minute characters of surface—texture and color and pubescence—which may be the vital clues to a plant's identity. The only sovereign remedy for the European itch is that ticket to Cherbourg.

Bearing in mind the elusive and variable nature of the quarry, we may well turn to the hunt, and as we go along pause to consider an occasional example of the bag. It is now February, the place Madrid. New York lies under a blanket of snow; but although we are here at the latitude of Long Branch, New Jersey, and well over a thousand feet up, there is a springlike gaiety to the cold blue sky and in the botanic garden an ornamental white garlic, *Allium victorialis,* is beginning to unfold its starry umbels. The Garden dates back to the late eighteenth century and is laid out in the formal patterns of the age, more park than garden-like in atmosphere, with its grid of sand paths, benches, and statuary. But the statues are memorials to Spanish botanists of long ago, Cavanilles and Quer and Lagasca, and the Garden itself is situated in the city's heart, next door to the great Prado Art Museum, not banished to the suburbs. In these wooded plots, which appear somewhat forlorn so early in the year, there flowered for the first time in Europe many plant species introduced by Sessé and and Mociño from Mexico and by Ruiz and Pavón from Chile and Peru. The Botanical Institute is housed in a low building fronting on the Garden, and it was here that I received my first disappointment and my first shock of surprise. It was a grievous disappointment to learn that the herbaria of Lagasca and Ortega have disappeared, and no sample of the plants they described from the Garden is known to have survived; their species must be interpreted from the published texts. It was a great (and unwelcome) surprise to find that a little annual *Dalea* in the herbarium of Cavanilles was a common weedy species which ranges from northern South America to Minnesota, and not the comparatively rare species native to Mexico that in most modern texts masquerades under the old Cavanilles name. The name proposed by Cavanilles passes into the synonymy of one a little older, while the less common species involved in this comedy of mistaken identities required an altogether new name.

The Conservatoire at Geneva, Switzerland, occupies a handsome villa overlooking Lac Léman beyond which rises a wall of snow-clad Alps. One would expect it to house an affluent bourgeois family, but in reality it shelters one of the world's greatest and most valuable collections of plant material, built up around the herbaria bequeathed to the city of Geneva by the de Candolle and Boissier families. The elder de Candolle (Augustin Pyramus, 1778-1841) wrote one of the first monographic studies of *Astragalus,* a genus of legumes in which I have a particular interest, and it was a vivid delight to handle some of the venerable specimens that served so long ago as models for the descriptions and handsomely engraved illustrations published in his *Astragalogia* in 1802. An heirloom belonging to the Conserva-

Statue of Antonio José Cavanilles (1754-1804) in the Botanical Garden at Madrid, Spain.



toire is the herbarium of the *Prodromus,* kept apart from the general herbarium and now in process of being photographed, sheet by sheet, for posterity. It illustrates the *Prodromus* (precursor, or blueprint) *to a Natural System of the Vegetable Kingdom,* a seventeen-volume text published between 1824 and 1873 and descriptive of the world's flora as then known. In this sector of the Conservatoire I found myself obliged to select, from among several specimens owned and examined by de Candolle in 1825, not all of which represent the same species, a lectotype which would determine the future use of a name based on mixed materials—a difficult and responsible decision. In the main herbarium are found among other treasures the plants collected in eastern Texas (then Mexican territory) by Jean-Louis Berlandier; many Mexican *Leguminosae* named by Möise Moricand in the 1830's; and a sprinkling of very early Central and South American plants distributed from Madrid by Pavón, presumably out of the Sessé and Mociño collections. We shall encounter the latter, enigmatically labeled but of engrossing interest, in greater numbers at Paris and London.

The University of Lyon in France possesses the extensive herbarium of Michel Gandoger, an eccentric but gifted botanist who is remembered chiefly for his explorations in Spain and Portugal. Gandoger's principal work is a twenty-seven–volume Flora of Europe printed in direct facsimile from his meticulous manuscript, but his interests were catholic, and he published papers on plants of Russia, Argentina, and North America. About 1900 he received small sets of Rocky Mountain plants collected by Aven Nelson, C. S. Crandall, and others, and very characteristically he described all that did not fit already published descriptions in every particular. Unfortunately a number of errors in interpretation and copying of the labels were incorporated into the printed record, so that without visiting Lyon it is impossible to match up the specimens actually seen by Gandoger with duplicates presumably retained in America. It was amusing and vexing to find that some discrepancies in the labels were owing not to any fault of Gandoger, but to careless and abbreviated labels prepared for export.

The Phanerogamic Department of the Paris Natural History Museum is believed to possess over five million specimens (compared with the three million here at the Garden); it is one of the great storehouses of botanical knowledge. Apart from the vast general collection it boasts several smaller herbaria of historic interest, among them the collections of the prince of pre-Linnaean botanists, Joseph Pitton de Tournefort, the American plants of André Michaux illustrating his *Flora Boreali-Americana* (1803), and the first set of Amazonian, northern Andean, and Mexican plants collected by Alexander von Humboldt and Aimé Bonpland, many of them holotypes of species published in the lavishly illustrated *Nova Genera et Species* (1815-1825), of which the principal author was Sigismond Kunth. It was interesting to discover that the general herbarium contains many duplicates originally in Bonpland's private collection; some of these are larger and better specimens and bear fuller data of locality. In some cases Bonpland's isotype is of greater practical value in interpretation of a species than the holotype studied by Kunth. In the Paris herbarium I was able to settle to my own satisfaction the identity of an *Astragalus* collected by Humboldt at an unknown locality in America. It has been thought Mexican in origin, although not collected since Humboldt's day in that country; the type, however, represents a subshrubby species endemic to the high mountains around Quito in Ecuador, where it passes under a much later name than that proposed by Kunth. Another surprise in the same genus was a weedy little species which was described over one hundred and fifty years ago from plants grown in the Jardin des Plantes in Paris. The author of the name neglected to record the country of origin, although this is given as Mexico on a contemporary label; as a consequence it became one of those binomials that linger on in the limbo of botanical indices as nomenclatural stumbling-blocks without any known use, never having been associated with a species growing in the wild. The holotype is a very characteristic example of a species common in the pine-clad highlands surrounding the Valley of Mexico, where it has been known since about 1895 under what now turns out to be a later synonym. In the two cases just described, a study of types has led to the restoration of an old, neglected name, and demonstrates one of the reasons why the nomenclature of plants has not yet reached a stage of perfect stability.

The botanical pilgrim in England approaches Kew Gardens in a frame of mind which might be likened to that of a devout Moslem drawing near to Mecca. The Museum, or Royal Herbarium, is not the oldest institution of its sort in the country, but it is the largest, and the richest in associations and achievements. The herbaria of the Hookers, father and son, and of George Bentham are of unexcelled importance for North American botany. During the great days of botanical exploration, in the mid-nineteenth century, collecting agents under Bentham's direction were sending home a flood of plant material (both dried and living) from all quarters of the globe, and much of the material upon which the early Floras of the British overseas possessions were based is now to be found at Kew. Here are the plants of David Douglas from Canada and California that were named by the elder Hooker; Bentham's sets of Thomas Coulter's and Theodor Hartweg's collections from California and Mexico; Seeman's plants from the Sierra Madre in western Mexico and Behring Straits; a set of Nuttall's Rocky Mountain plants, second only to those at the British Museum and in New York; the plants of Andreas Geyer, a German naturalist who crossed North America by the Missouri-Platte-Columbia route a few years after Nuttall. I can mention here only a few which particularly concerned me.

Most of the North American types at Kew have been canvassed by American botanists, starting with Asa Gray a century ago, but there are still surprises to be found, as illustrated by one old collection from California. In 1831 Thomas Coulter, an Irish physician and plant-collector, made an adventurous journey from Monterey on the California coast to the mouth of the Gila River in what is now the southwest corner of Arizona. On his way across the Colorado Desert, which he was the first botanist to reach, he picked up a curious *Astragalus* later named in his honor *A. coulteri.* When Gray examined the type in Bentham's collection, he identified it with a species now known to inhabit a quite restricted area of sandy desert near Palm

Springs, and the name has been employed in this context for nearly a hundred years, right up to the modern California Flora of 1959. But Gray was mistaken. Coulter's plant is not the Palm Springs *Astragalus* but a related one, similar in general appearance but different in subtle characteristics of the flower and the pod, and found in quantity after a rainy winter over the sandy plains of the Yuma Desert, where the Gila River discharges into the Colorado. With this discovery a lamentable change of names has become necessary; as a compensation, however, the nomenclature of the group has reached a stage of terminal stability so far as the future can be foreseen.

My principal errands at the British Museum in London were concerned with the herbaria of Peter Simon Pallas, Thomas Nuttall, and Philip Miller, Pallas, a favorite of Catherine the Great of Russia, was one of the first naturalists to reach the mountainous heart of Asia, from which he brought back important collections of plants and animals. In his old age, living in poverty in the Crimea, Pallas sold his herbarium to an English traveler, and it thus happens that the types of many leguminous plants described by him in his travels and elsewhere are now found in London and not, as one might expect, in Moscow. I was particularly interested in the type of one Pallas *Astragalus* which I had reason to think was native to western United States as well as Siberia, even though the original description, and subsequent ones up to the very latest Russian Floras, called for one important morphological difference between the Old and New World plants. It turned out that Pallas misinterpreted the characteristic in question, and his mistake has simply been copied and recopied from the year 1800 right up to the present day. Philip Miller was a contemporary of Linnaeus and one of the first botanists of established repute to adopt the Linnaean method of binomial nomenclature. In his celebrated *Gardeners Dictionary,* Miller described many exotic plants grown in the old Apothecaries' Garden in Chelsea. Among them was a little annual leguminous plant from Mexico, which seemed from the description to have been a *Dalea,* although it was described as a member of a related genus of decidly perennial character. The type was readily recognizable and represents a *Dalea* common on the Mexican plateau which has been known from early times, because of its deliciously lemon-scented foliage, as *Dalea citriodora.* The latter was described by Cavanilles from plants grown at the Botanic Garden in Madrid a few years after its first and independent introduction into England.

The leguminous plants collected by Thomas Nuttall in the Rocky Mountains and on the Pacific Coast are mostly represented in herbaria at Philadelphia, or at Harvard, or here in New York (and often at all three), but Nuttall's own herbarium was bequeathed to the British Museum, which possesses the holotypes of the majority of his species. Nearly all the holotypes are duplicated in the United States, but there is one controversial astragalus of which the type-set in America is altogether mystifying, and I had hoped to find in London the solution to a problem which has vexed several generations of Nuttall's followers. The astragalus in question was described under the name of *Phaca debilis* and its habitat given as streamsides in the Rocky Mountains, but the specimens so labeled by Nuttall in American herbaria represent a species native to dry woodlands in the southeastern United States; they could not possibly have come from the Rocky Mountains, although they agree fairly well with Nuttall's original description. Some have supposed that the specimens are mislabeled and that the plant described by Nuttall is a species (*A. bodini*) found in water-meadows and on the grassy banks of mountain brooks in Wyoming and Colorado; but no Nuttall specimen of the latter was known to exist. The specimen in Nuttall's herbarium in London is an exact match for the *Phaca debilis* preserved in American herbaria, that is, the southeastern species; but I was delighted to find that Nuttall had encountered the moisture-loving, mountain species, even though his specimen is not much more than a fragment with a single spike of flowers. This specimen introduces a new and disturbing element into the puzzle, for it is associated with a characteristic Nuttall label featuring a name that never was published. I conjecture that this was the astragalus that Nuttall found inhabiting the banks of streams in the Rocky Mountains, but because of some accident the habitat-data were transferred to another set of specimens. Thus *Phaca debilis,* as described by Nuttall, partook of characteristics of two species, one of the Ozark Plateau, the other of the Wyoming Rockies. As we cannot be sure that this is actually the case, the mystery surrounding *P. debilis* remains, and will probably always remain, a tantalizing enigma.

I have already mentioned coming across ancient specimens from Mexico in the herbarium at Geneva and elsewhere. There are many more at the British Museum and others in the small but historically important herbarium at Oxford University. The specimens to which I refer have as labels a slip of faded yellow paper on which a plant name is written in an antique hand, followed by the initials N. E., sometimes spelled out as Nueva España, the old colonial name for Spanish possessions in Mexico and Central Amer-

Residence of Baron Raul Valenciana in Guanajuato, Mexico. The plaque at the right of the entrance reads: Alexander Humboldt resided here in this house, August-September, 1803.

ica. Some of them bear old annotations which identify them as parts of the enormous collection amassed in Mexico by Martín de Sessé y Lacasta and José Mociño, who were employed by the Spanish government on an ambitious program of botanical exploration during the last decades of the eighteenth century. The purpose of this exploration, a Flora of Mexico, was never realized; the whole project languished and finally petered out in labyrinthine bureaus of the central government, but parts of the herbarium were distributed to interested persons in western Europe, and thus a number of Sessé and Mociño's very numerous and at the time extraordinary new plants were described at centers of botanical activity in several countries. Then about seventy years ago some manuscripts of Sessé and Mociño were published in Mexico, a pious but in some respects unfortunate enterprise, for the merit that their taxonomic work possessed at the time it was composed had been lost with the passing years. By one means or another numerous plant names have been validly published which go back ultimately to plants collected by Sessé and Mociño, and all their specimens deserve a careful scrutiny for their potential or actual value as types. Among the sets of Sessé and Mociño material distributed by Pavón and Cervantes from Madrid, an important one was acquired by A. P. Lambert, an English country gentleman who amassed at his home in Wiltshire during the early nineteenth century a large and varied private herbarium; this was consulted in its day by such eminent American botanists as Frederick Pursh and Thomas Nuttall. It so happened that Lambert had in his employ a gifted Scottish botanist, George Don, who undertook the preparation of a revised and expanded version of Miller's Dictionary, an encyclopedic work designed to describe for the benefit of botanists in general and gardeners in particular the higher plants of the entire world. Four fat volumes of Don's *General History of Dichlamydeous Plants* appeared between 1831 and 1838 (owing to the unexpected size and expense, the work was never completed), and in these we find many references to the Sessé and Mociño plants in Lambert's herbarium. At Lambert's death his herbarium was sold at auction and dispersed; no record of its fate survives, and no type-specimen annotated by Don is known certainly to exist. The interpretation of his species, often briefly described, has become a matter of extreme difficulty, especially when they belong to large and critical genera. Don, for example, described fifteen daleas from Lambert's herbarium, the majority expressly credited to Sessé and Mociño, and his names, never having been associated with recognized species, on account of their age pose a continuous threat to later ones in current use. I had hoped, by correlating the scattered material that lurks in various herbaria under a number of unpublished names, to determine which daleas, and how many of them, Sessé and Mociño collected, after which it might be possible, by means of elimination and selection, to match them up with the descriptions of Don and others. My data are incomplete, and it is impossible to say as yet how many names can be identified and saved. The recognition of one of them in the Sherard Herbarium at Oxford was an unexpected and intensely gratifying dividend of my visit to England, and the story of this one species must terminate these notes.

One of the most distinct species of *Dalea* known to me before I left for Europe was a slender annual with tiny, round, hairless leaflets and beautifully silky flower heads suggestive of the hare's-foot clover (*Trifolium arvense*). It is represented in American herbaria by a single, comparatively recent collection by Mrs. Ynez Mexía from the Sierra Madre Occidental in Mexico. A remarkable feature of its leaves is the lowest pair of leaflets, a little larger than the rest and folded inward to embrace the stem, resembling stipules rather than leaflets in consequence. It was unlike anything described in the last summary monograph of the genus, and I had gone so far as to select a name for it and prepare a description for publication. Since it was known only from a single collection, it seemed most likely to be rare and local. It was an astonishing surprise to come across a second specimen, associated with one of the old Nueva España labels, presumably a Sessé and Mociño plant collected well over one hundred and fifty years ago. Still more interesting was an annotation in an old but unfortunately unrecognized hand, identifying the specimen with *Dalea pulchella* Don, one of the mysterious fifteen mentioned above. Furthermore, the specimen agrees very closely with Don's description, even down to the curiously enlarged and incurved lower pair of leaflets. Had I found the holotype of *D. pulchella,* the specimen actually seen by Don in Lambert's "botanical cabinet" at Boyton? I do not know, and I hardly expect ever to know for certain. The Oxford herbarium owns no other daleas similarly annotated, although there are a few more sheets bearing the old Nueva España label, and it is hard to imagine how only one out of many Lambert specimens could have found its way to Oxford. I should perhaps be content at having settled the application of one old name, but I am not.

The reader who has followed me this far in the search for types in Europe will have guessed that I have already started a new list and that I am already planning a return engagement.

PAULOWNIA (Continued from page 211)

health, and the promotion and maintainance of beauty. In Chinese-style medical practices, the bark, wood, leaves, flowers, and fruit of the paulownia are employed.

An aqueous solution, prepared from the leaves and capsules of the paulownia, is prescribed for daily application to promote healthy growth of hair, and another for turning gray hair black. An aqueous solution is prepared from the leaves and wood to be used for swollen feet. A tincture prepared by heating the inner bark of paulownia in two parts of water and one of whiskey is administered internally to relieve high fever and delirium. The leaves steamed in vinegar or the ground bark fried in vinegar are prescribed as dressings for bruises. . . .

In an age when effective antibiotics and other pills are extracted increasingly from flowering plants as well as from molds, scientific investigations of the active principles of the bark, wood, leaf, flower, and fruit of the different species of *Paulownia,* and qualitative evaluations of the empirical remedies derived from this tree, may lead into important discoveries which may bring well-being to many people, and profit to some.

NEW ZEALAND REVISITED

By PIERRE DANSEREAU

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Continued from the September-October, 1962, issue

An afterthought in 1962

There could be a great deal more of this journal. The period from June 2 to August 7, 1961, was no less eventful than the days between April 5 and June 1. But I did not stick to my purpose of recording those precious moments day-by-day. And now I might seem too wise even to myself if I were to put down my impressions in retrospect, and I shall not attempt it.

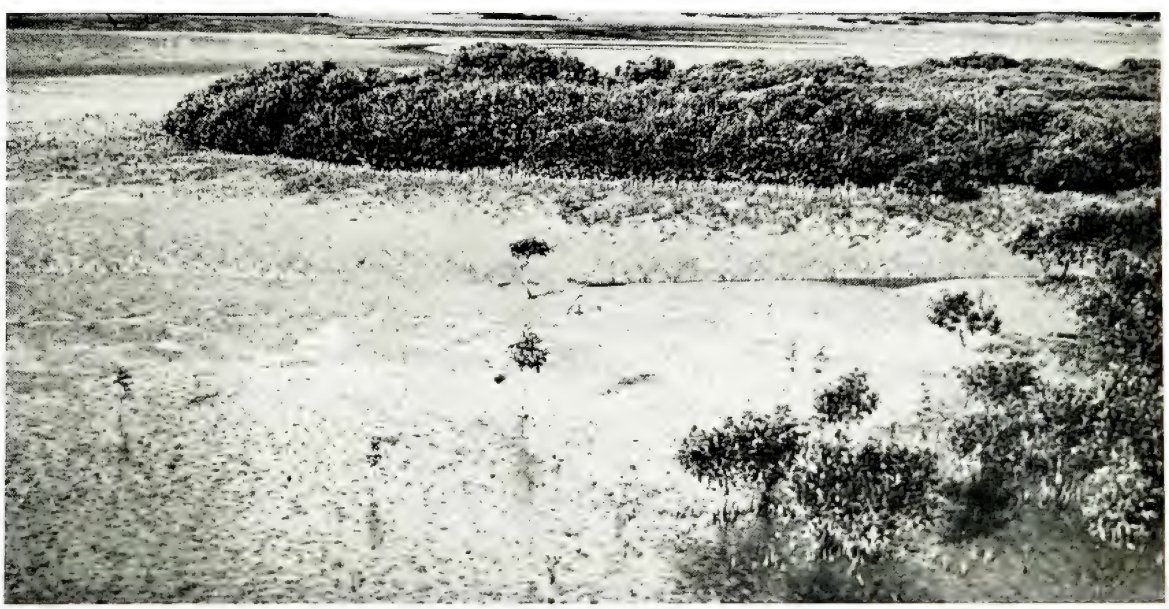
I was able to carry on extremely profitable field work in the North Island with Professor J. G. Gibbs, Dr. A. P. Druce, Dr. W. H. Harris, Professor V. J. Chapman, Dr. L. Millener, Dr. J. Rattenbury, Christopher Quinn, W. Silvester, Dr. J. Nicholls, Dr. P. McKelvey, and Roger Cameron. On the other hand, I derived a great deal of profit from a "vegetation of the world" course which I offered as a series of twelve lectures in Dunedin, six lectures in Auckland, and four in Wellington. I am especially grateful to my audience at the University of Otago where staff and students of botany and geography engaged me in a most lively dialogue.

There were many other happy experiences and meetings. Sir George Currie, President of the University of New Zealand, invited us to his home, where we met many New Zealanders who are responsible for national policy (economic, political, and educational) and several diplomatic representatives of other lands (Canada being rather conspicuously absent). To this distinguished assembly I spoke (rather tremulously) on the impact of United States culture on Canada. I also addressed other groups, in and out of the universities, on Canadian culture, or rather on the two Canadian cultures that continue to drift so far apart. This perspective was relatively new, as was the idea of a separate French Canadian state, and a great deal of questioning and discussion took place.

At this time, I have two botanical contributions almost ready for the press, one in collaboration with Alan Mark. A year after leaving, I can begin to estimate my debt to New Zealand scientists, for I have acquired many new facts and ideas. It has been a rare satisfaction to live in a country where botany is so highly regarded! The social experience has also been a most enriching one. I have tried to record some of this in my journal and sincerely hope that my spontaneous expressions will have hurt no one. In fact, I developed such a feeling of identification that I hopefully set down my reservations and criticisms as though they could do no more harm (and no more good?) than those I often heard from the New Zealanders themselves.

I shall attempt, nevertheless, to show a few additional sketches of New Zealand which reveal some of the aspects not already mentioned, whether they refer to the natural landscape or to the psychological inscape.

TAUTUKU BAY AREA. This lies south of Dunedin, about halfway to Invercargill. It is one of the most strategic study areas in the South Island. Extensive tracts of upland forest still remain in various stages of regeneration. Rimu (*Dacrydium cupressinum*) regenerates very well here, and there are vigourous young stands, with a second layer of *Weinmannia* and *Elaeocarpus* and plenty of ferns: *Cyathea smithii* and *Blechnum discolor*. *Podocarpus ferrugineus* and *P. hallii* are quite common too, and so is *Pseudowintera colorata*. In the more mature stages, this forest is hung and carpeted with mosses, not the overwhelming drapery of the red-beech forest, but a considerable epiphytic cover. The hanging fronds of *Tmesipteris* are very abundant. (I do not know how many times I have collected this mythical plant. So nice to see something that looks exactly like the books say it should? a rare and wonderful plant, here abundant?)



The low scrubby mangrove on the tidal flats near Auckland. It consists exclusively of *Avicennia resinifera*.

Pioneer seedlings of *Avicennia* in the estuary at Paparoa.

This area has varied topography. A barrier of dunes, checked in their advance by a sheared screen of rata (*Metrosideros umbellata*), under which a thick layer of hard-leaved tree ferns (*Dicksonia squarrosa*) grow. The staring blue eye of a pond surrounded by a bog mat, with a *Dracophyllum-Leptospermum* scrub encroaching upon *Eleocharis acuta* and blinking tufts of *Schizaea.* An elevated ravine with relict giant silver beeches in their frosty pocket and ever-so-many ferns, mosses, liverworts, and lichens covering all the branches.

Here one looks upon the tantalizing interplay of history, climate, soil, and sociological rivalry of the elements: beeches from colder climes, manuka in one of its original centres of dispersal, rimu and mahai in their forest optimum, rata binding the sands . . .

WELLINGTON. This is the windy city that I remembered. This time, however, we become much better acquainted. And how it has built up in all directions, uphill and around the capes and into all the neighbouring valleys. Here one gets the impression of dynamic industrial growth. The university, which used to lag somewhat, is building up and has developed many new departments and is strengthening old ones.

Botany students are quite numerous. I am privileged to take part in a weekend excursion with a group of them and with Professor J. G. Gibbs (who was my mentor in Wellington). It is a rainy time, and although I am quite prepared for inspired improvisations on altitudinal zonation and developmental polymorphism of woody plants, I am soon outdistanced by those enthusiastic mountaineers and return to the warm plush of the hotel.

It is wonderful to see my old friend Will Harris (my faithful guide and instructor in 1949) and to be put up-to-date on his pollen analyses. He is now way back in the Tertiary and has found evidence of *Casuarina* in New Zealand!

TONGARIRO. Christmas-card landscape in July (the January of the Southern Hemisphere). A long tramp through mountain-beech woods, their stiff, black boughs heavy with freshly fallen snow. We walk single-file on the winding path, our faces happily spattered by the springing branches. We emerge on a heath (literally: it is invaded by *Calluna vulgaris*) where the students cavort and pitch on the yielding snow-capped shrubs.

The following day, the snow had gone but Mt. Tongariro was still shrouded in mist. The grass-and-shrub land (*Danthonia-Dracophyllum*) is quite extensive, as are also bracken patches. Towards the north many miles of rather desolate landscape where tall thin *Leptospermum* and low tufted *Cassinia* look like *Picea mariana* and *Kalmia angustifolia* in the wastes of northern Canada. And the weather, too, is almost Canadian in its raw coldness.

AUCKLAND. This is a truly lovely city, with its gardens and parks, its beaches, its sailboats—and in spite of its architecture. There are two very good restaurants—"unlicensed" (not a single restaurant in all of New Zealand may serve wine!), many stylish espresso coffee houses. Hotels as bad as in Wellington and Christchurch. Guests all do their darndest to please the management. We are eventually lucky enough to find an apartment in the suburbs and to become acquainted with some very attractive people who give us a happy view of family life.

University circle very lively: science and humanities group provides much discussion and many original ideas. (In spite of which, a scene in the Faculty Club at lunch time: professors sipping sherry, rise as one man and rush to lunch table when gong sounds at one o'clock sharp. A slight discussion with some of them on the awful conformity of Americans!)

MANGROVE. With Valentine Chapman, world authority on salt-land vegetation (see *Salt Marshes and Salt Deserts of the World,* Interscience Publishers, New York, 1960), and with Christopher Quinn, many interesting hours

Maximum development of the *Avicennia resinifera* mangrove (trees about twenty feet in height) at Paihia.

in mangrove. In New Zealand, north of 38° Lat., the great mangrove complex comes to an end. Whereas in Indonesia it consists of a good number of species of fair-sized trees, it lies here well beyond its optimum, with only one woody species: *Avicennia resinifera.* Moreover, this is a mere scrub most of the time, especially in the Auckland area. At the Pacific Science Congress (Honolulu, August, 1961), van Steenis pointed out the gradual floristic depauperation of mangrove from Malaysia eastward and westward. For instance, the African communities are very poor.

WAIPOUA. The famous kauri forest revisited. In 1949 (at the Pacific Science Congress), I had taken part publicly (radio, newspapers, Congress platform) in the controversy over protection of kauri (*Agathis australis*). I had been told in no uncertain terms: "Canadian, mind your own business!" Nevertheless, the efforts of New Zealanders, backed by international pleas, had been rewarded the following year. And now I am able to witness the result: a really very vast area fully protected.

In Waipoua Park several stages of forest development are represented and suitable management should maintain this broad span. Kauri does not do best under conditions of final maturity of the forest, but in some penultimate phase.

Christopher Quinn, an easy-mannered and very capable young Tasmanian, recently come to Auckland University takes us to Waipoua, and together we go through the vast "cathedrals" of the giant-tree forest. Of course, *Agathis* does not reach the great heights of *Sequoia,* but its girth is equally impressive, its bark gray, pachydermous, tightly fitting the tall unbranched trunk up to its rather meager crown. The young trees are so unlike these giants, cone-shaped, very green, leafy. The woody flora is quite rich, with many of the podocarps and the broad-leaved species reaching canopy level; araliads and tree ferns in a lower stratum, as well as lianas (*Freycinetia, Metrosiderous, Lygo-*

(Continued on page 227)

Deforestation and silting at Waiwera: in foreground, pasture and cabbage-tree (*Cordyline australis*); on far side of river, at left, low scrubby mangrove; on hills, pasture, manuka scrub, and relicts of forest (including *Podocarpus totara*).

FOSTER BOTANICAL GARDEN

Present Status of Botanical Gardens in Hawaii

By Paul R. Weissich

Mr. Weissich, who is the Director of the Division of Botanical Gardens of Honolulu, presented the following at the "Symposium on Tropical Gardens" in the Tenth Pacific Science Congress, held at the University of Hawaii, Honolulu, August 26 - September 6, 1961, and sponsored by the National Academy of Sciences, the Bernice Pauahi Bishop Museum, and the University of Hawaii.

L. H. Bailey has defined a botanic garden as "a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge." In practice, the definition further includes the presence of a library, an herbarium, laboratories, publications, and a scientific research and teaching staff. These are the means of advancing and diffusing botanical knowledge.

If we accept Bailey's definition, this paper will be the shortest presented at the Congress, for there are no institutions in Hawaii that meet his definition. I must assume, therefore, that I may be permitted to stray from the subject to discuss several activities of botanical interest which might qualify if I were speaking several years hence.

There are four main areas that are botanically noteworthy: 1) The Lyon Arboretum; 2) The arboreta of the Board of Agriculture and Conservation; 3) The activities of the Hawaiian Botanical Gardens Foundation relative to the founding of a national botanical garden in Hawaii; and 4) Foster Botanical Garden.

The Lyon Arboretum is owned and primarily financed by the University of Hawaii Foundation. The Foundation derives its funds for the arboretum from the estate of the late Dr. Harold L. Lyon. The arboretum is, for all practical purposes, the arboretum of the University of Hawaii. Income from the Lyon Estate affords the Foundation sufficient funds to hire a superintendent and one laborer. The University supplements this with one additional laborer and one-eighth time of a technical staff member of the College of Tropical Agriculture.

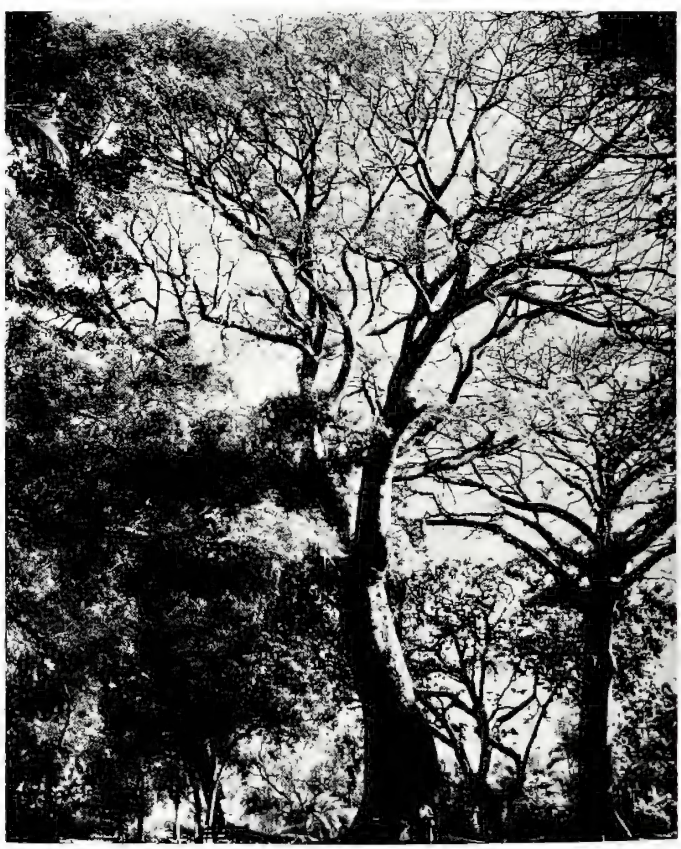
The Lyon Arboretum comprises one hundred and twenty-four acres of land at the head of Manoa Valley and not far from the University campus. It is a cool, wet area which receives one hundred and fifty inches of rain annually.

Originally the site was an eroded, scrub-littered cow pasture. Dr. Lyon, then head of the Division of Botany of the Hawaiian Sugar Planters' Association Experiment Station, undertook the planting of the area as a demonstration of reforestation possibilities for similar areas in other parts of Hawaii. Work was started in the 1920's. At present most of the arboretum is a densely wooded, sometimes jungle-like plantation containing a considerable variety of tropical vegetation. In general, the planting reflects the accessions of Foster Botanical Garden, of which Dr. Lyon was also director from 1930 to his death a few years ago, and which is one of the major botanical assets of Hawaii. It has been more than disappointing that the University has not been able to further its development, even to the extent of providing adequate labor to re-establish old trails and eliminate over-aggressive weed trees.

The arboreta of the Board of Agriculture and Conservation, including its Hilo nursery and plantings, reach back to the same period as the Lyon Arboretum. In the absence of an aggressive reforestation and water conservation program of the then Board of Agriculture and Forestry of the Territory of Hawaii, the Sugar Planters launched an experimental program, headed by Dr. Lyon, to locate and evaluate suitable reforestation trees which would insure a watershed to supply Hawaii's sugar industry.

The Lyon Arboretum was the "show-place" of dozens of arboreta scattered at various elevations over Oahu and Hawaii on government-owned or controlled lands. Many of these were small acreages dedicated to plantings of single species; others contained mixed plantings. These arboreta, totaling many hundreds of acres, are now fine groves of sizeable trees. They are of prime importance to foresters, some of them to potential sawmill operators; but if they were properly organized and controlled, they could become a valuable addition to a botanical garden system. The plantings comprise an impressive array of genera and species in sites ranging from sea level to an elevation of five thousand feet. An especially fine series of collections may

The large tree in the center foreground is *Enterolobium cyclocarpum*. The tree with buttress roots, at the right, is *Ceiba pentandra*. *Terminalia catappa* is in the center background. Also visible is a portion of the palm garden of Foster Botanical Garden.



The fern walk in Foster Botanical Garden.

be found on the Island of Hawaii.

A third movement, which is still in the discussion stage, is the effort of the Hawaiian Botanical Gardens Foundation to establish a national tropical botanical garden in Hawaii. The Foundation rightly points out the need for a complete garden to provide tropical materials and facilities for their study. Hawaii is the only State in the Union that provides the combination of climate and soil necessary for a truly tropical garden. The desirability of such a garden need not be pointed out to the delegates to this Congress.

The Foundation has selected beautiful Kahana Valley in windward Oahu as the most appropriate site for its garden. The valley contains thirty-eight hundred acres, of which fifteen hundred are suitable for planting. Rainfall is plentiful. The valley opens to the sea and rises to the pali of the Koolaus. One hundred years ago Hillebrand suggested Kahana as a site for a botanical garden.

A complete "Bailey-defined" botanical garden is envisioned with plantings, scientific staff, laboratories, and so on. Funds have been requested from the Congress of the United States for a feasibility study to determine the suitability of the site, land purchase costs, capital improvement costs, and the required staff. No definite plans have yet been proposed, but the Foundation's idea has great botanical value. Pending an affirmative report on feasibility, it will be up to the Federal Government to weigh the concept, define it, design it, and finance it.

The last of the four botanical activities is one on which I can elaborate somewhat. It involves an existing partial botanical garden of which I am the Director. Many of you have visited the headquarters garden, Foster Botanical Garden; in order to indicate the status of this area, it is necessary to sketch its history.

One hundred and ten years ago William Hillebrand, author of *Flora of the Hawaiian Islands,* acquired two acres of land at the mouth of Nuuanu Valley. There he built his home and surrounded it with trees which he brought to Hawaii from the Asiatic and American tropics. The largest trees to be seen at Foster Botanical Garden today were planted by Hillebrand. The Foster family later purchased the site from Hillebrand and added more acreage and plantings. In 1930, upon the death of Mary Foster, the property was bequeathed to the people of Honolulu under the jurisdiction of the City and County of Honolulu. Dr. Lyon, mentioned earlier in this paper, became the director of the garden and was responsible for Mrs. Foster's decision to give the garden to the city. Dr. Lyon was, at the time, developing what became the Lyon Arboretum and the arboreta of the Board of Agriculture and Conservation.

In January, 1961, the City and County of Honolulu embarked upon a formal botanical program and established the Division of Botanical Gardens, of which I was appointed Director.

Honolulu has been generous to the "new baby." Landwise the program has grown rapidly. Land is expensive in Hawaii—far more costly than buildings—and difficult to obtain where and when one wants it. The new Botanical Gardens Division has jurisdiction over four hundred and fifty acres of land, valued approximately at twenty million dollars. Of this area the City presented, since July 1, 1961, nine new acres adjacent to Foster Botanical Garden, thereby doubling its size; and this week the Division has acquired a fifty-acre beach site for the development of a tropical strand collection.

To dispel confusion about the various sites within the control of the Botanical Gardens Division, I list the following existing areas:

Foster Botanical Garden: 18 acres, at 40′ elevation, 40″ annual precipitation.

Wahiawa Botanical Garden: 27 acres, 1000′ elevation, 80″ rainfall.

Lyon Botanical Garden: 350 acres, 100′-500′ elevation, 20″ annual rainfall.

Kapiolani Hibiscus Garden: 2 acres, sea level, 20″ annual rainfall.

Walumalu Beach Botanic Garden: 50 acres, sea level, 20″ rainfall.

Kapiolani Nursery: 4 acres, sea level, 20″ rainfall.

Plans are now afoot to add a very sizeable acreage, extending to an elevation of two thousand feet with high rainfall. This area will complete the major ecological settings for a complete tropical planting program.

Of the existing sites only Foster Botanical Garden is at all developed; its status is semi-botanical. An excellent start has been made on Bailey's requirement of "a collection of living plants." Additions to the present collections are being made through an active import and exchange program, which introduces approximately one thousand new plants to Hawaii annually. A special effort is being made to determine successful methods of growing the endemic flora, including plants from high elevations. Most of the surviving species of *Pritchardia,* for example, are being grown at Foster Botanical Garden. Similar trials are being made, with varying degrees of success, with the endemic species of *Hibiscus, Gardenia, Pleomeles, Pittosporum,* and others. The major research of the Division of Botanical Gardens will be directed toward the endemic flora in both a scientific and popular vein. At least one portion of the flora may be saved from a final resting place in an herbarium, if ways can be discovered to grow them under garden conditions. Education in this area may lead to conservation. As the Bishop Museum preserves the feather cloaks and other artifacts of a society destroyed by Europeans, so may Foster Botanical Garden preserve living specimens of a flora that is being similarly destroyed.

The botanical gardens reach the public in several ways. Approximately one hundred thousand persons visit Foster Botanical Garden anually; six thousand school children a year are reached through guided educational tours. Last year forty lectures were given to community groups on garden and plant subjects. A supporting organization of now four hundred members was formed in 1961. Through its Director the Garden is represented in many community organizations and cooperates with beautification groups, garden clubs, Chamber of Commerce, and civic associations. All this is footwork leading to the recognition of the botanical garden as a practical, useful force in the affairs of the community. Its influence is already felt, for the City has authorized working drawings for capital improvements of $800,000 at Foster Botanical Garden. The plans include completion of the nursery facility (toward which the City

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HAWAII - A BOTANICAL AND HORTICULTURAL OPPORTUNITY

By RICHARD A. HOWARD

Dr. Howard, who is Director of The Arnold Arboretum, Harvard University, Cambridge, Massachusetts, gave an illustrated talk on this subject at the Sixteenth Annual Horticultural Congress, Northampton, Massachusetts, in October, 1961.

A NEW STATE OF THE UNION, like a new piece of personal property, deserves to be examined, understood, and finally placed in proper perspective with the others associated with it. Hawaii became the fiftieth State of the United States of America in 1959. In the decade that this acceptance was being considered and in the few years since its occurrence, an ever increasing number of mainlanders have visited the islands and have come back pleased and with fond hope of returning there. The tourists to Hawaii numbered about fifty thousand in 1951 and increased to an estimated three hundred and ten thousand in 1961. Nearly all of them found what they expected—a delightful blend of human races, palm trees, lovely beaches, colorful plants, mountains and volcanoes, hulas, luaus, and muumuus. Tourism is encouraged and is becoming a significant part of the economy of the island State. Currently, the Federal government, through its military establishments, supplies the largest percentage of income for the island's economy. Agriculture, primarily the crops of sugar cane and pineapple, ranks second, and tourism is a strong third.

The tourists, however, see a small portion of the State of Hawaii and probably understand even less of the problems of an island environment which can be biological as well as economical. The State of Hawaii, composed of seven major islands, is but a small fraction of a longer archipelago which stretches nearly nineteen hundred miles, ending in the vicinity of Midway Island. This longer chain represents the results of volcanic activity along a rift in the floor of the Pacific Basin, where for nearly thirteen million years successive flows of lava and successive layers of ash and pumice have created mountains. Through long periods of time many of the mountains have weathered away. Some are now below the surface of the sea. The majority of those that form the islands of the fiftieth State are still subject to the forces of erosion, which have formed deep valleys, impressive cliffs, massive isolated spires, and deep accumulations of soil in alluvial fans. Hawaii, the largest of the Hawaiian Islands, in contrast, is still growing, having the youngest and the largest mountains and the principal areas of active volcanism on the mountain called Mauna Loa. Man has learned to live with volcanoes in Hawaii, where it is frequently said that people travel to see volcanic activity and not to get away from it. Nevertheless, in 1960, the town of Kapoho was destroyed or abandoned, and over seven hundred acres of sugar cane lost because of volcanic activity. Perhaps the increased revenues to airlines, hotels, and suppliers of cameras and film represent compensation, but not to all people.

Trees were killed, and cinders covered the road to the top of this fence, when the volcano Kilauea Iki erupted in 1959.

Lava flows of past centuries are still some of the most desolate land in the Hawaiian Islands. Natural reclamation by successive invasions of plant life may be rapid or slow, depending primarily on the type of volcanic material and the amount of water as rainfall or irrigation. Some scientific advances in the last fifty years have allowed greater use of areas covered in the past by products of volcanic activity. Foresters have learned how to replace the worthless *Metrosideros* with *Fraxinus, Pinus,* and *Eucalyptus,* and how to produce high-yielding plantings of timber trees. The use of bulldozers and steamrollers to move and crush "aa" lava has led to the use of many areas for housing developments or plantations of coffee in the Kona area and macadamia nut trees in the vicinity of Hilo. Some of these areas of land, worthless without enormous expenditures of capital, are being offered to the unknowing mainlanders through nearly deceitful advertising in rotogravure sections of newspapers and in magazines.

The older volcanic-based soils of the majority of the islands are the sites of some of the most advanced forms of agriculture in the United States of America. Faced with competition from cheaper labor areas, Hawaiian agriculture has learned to use irrigation, chemical fertilizers, chemical weed control, mechanical harvesters, and even gamma ray waves in the production of cane sugar. Pineapple, too, has been subjected to exacting controls during growth to

the point of inducing or retarding fruit formation for the most economical method of production. Both industries long ago formed cooperative research institutes staffed by outstanding scientists, who work with the most modern equipment and libraries, and supported by pro-rated financial contributions from the companies that benefit.

It is small wonder, then, that the landowners, most of whom are also the agricultural producers, were concerned when it was learned that the soils of Kauai, Maui, and even Hawaii contained aluminum ores in commercial amounts. The interests of nearly half a dozen aluminum and mining companies in mining these soils revealed that land and mining laws in Hawaii were archaic. The territorial legislature authorized a study of the mineral resources of Hawaii as well as a scientific experiment to determine the effects of strip mining of bauxite soils and to establish procedures not only for mining, but for rehabilitation as well. The bauxite mining and rehabilitation project on Kauai is open for inspection by interested people. A three-year project showed that strip mining could be accomplished without polluting the streams or forming an unsightly scar on the landscape. The aluminum ions in the soil are known to prevent the growth of some species of plants and to retard the growth of others. The removal of such aluminum rich ores actually allowed better growth of many plants. In the experimental areas, it was determined that with the use

The pineapple, *Ananas comosus*, has a dense head of small, abortive violet or blue flowers, crowned with a tuft of leaves. The edible "fruit" is the succulent stalk in which the berries are embedded.

Harvesters, walking along the rows of a pineapple plantation, select the fully ripened fruit, pick it, remove the crown, and place the fruit on a conveyor belt which extends before them from the mechanical harvester. The belt carries the fruit to the harvester, and the elevator lifts it to the bin. When the bin is filled, the harvester is raised sufficiently to permit the loaded truck to drive away, and another truck with an empty bin takes its place.

of chemical fertilizers, including lime, at a cost in line with that normally used in agriculture in the area, the production of sugar cane was actually increased. Groundcovers were rapidly established to prevent erosion. Forage crops of grasses and legumes increased the carrying capacity of the land many fold, and certain timber trees grew at rates far exceeding those in any comparable area. The results of these experiments allowed the formulation of appropriate mining and rehabilitation legislation which was enacted by the State legislature.

The tourist who visits Hawaii is greeted with a "lei" of flowers of introduced species of plants. As one travels around the islands, the most conspicuous and colorful herbs, shrubs, trees, and vines one observes are species man has introduced from other areas of the world. The South Pacific has yielded the largest number of spectacular plants for Hawaii's horticulture. Native plants of Mexico, the West Indies, and Africa are also represented by colorful forms. Not all of these have proved to be well behaved, however. *Lantana camara* from the West Indies, *Opuntia megacantha* from Mexico, and *Melastoma malabarthicum* from Asia are only the most conspicuous of the introduced plants that are now regarded as pests. Enormous sums of money are expended annually to control or eradicate these introduced species. Other species, less conspicuous and perhaps inadvertent introductions are the weeds of lawns, gardens, and crop areas.

The introduction of useful crop plants and ornamental species has been by private individuals, companies, botanical gardens, and governmental agencies. The costly role of some of these introductions is balanced by the fact that sugar cane, pineapple, papaya, passion fruit, coffee, and macadamia are introductions yet more important to the economy of the islands. The chance of a new introduction's becoming an obnoxious plant is remote, yet this point is raised in current discussions of the proposed national tropical garden for Hawaii. Bills to create such a garden have been sponsored by Hawaii's senators and representatives in recent sessions of the Federal legislature. Unfortunately, one can only conclude that each bill has been poorly drawn, for even the most recent one has not been accepted. The proposal has received a mixed reaction in Hawaii and by visitors who have been interested in its progress. There is no unanimity of opinion in Hawaii, either, on the location, the form, or the goals of the proposed national tropical botanical garden.

Foster Botanical Garden, a good local botanical garden, is improving year by year. The proposals of its director for substations in different environmental areas for the growth of different kinds of plants are sound. Local support is developing and could be increased. Such a garden could serve well the Hawaiian community.

The role of a national tropical botanical garden, whether it be independent of existing agencies or associated with the existing United States National Arboretum, Department of Agriculture, or National Park Service, would certainly be independent of Foster Botanical Garden of Honolulu and competitive with it. The opportunities for the introduction of new plants for Hawaiian agriculture or horticulture and the chance for American scientists to work in Hawaii through a larger botanical garden on problems sig-

Above. A macadamia tree, about ten years old.

Below. A close-up of the white flowers of the macadamia, which are borne in racemes about a foot long.

Young nuts—botanically they are hard, shiny drupes—on a branch of macadamia.

nificant to Asian areas and people are worthy of support. The desirability of accepting the locally proposed site of the Kahana Valley and the acquisition of its expensive land by eminent domain proceedings must be evaluated seriously and unhurriedly. Instead of a Federal bill to create a national tropical botanical garden, I suggest a small State of Hawaii appropriation to consider all aspects of research and display in botanical gardens, Federal and local support, expanded present facilities, and new establishments. For such a study to conclude with a consideration of a federally created garden would be most desirable. Such a report could obtain the support of many horticultural and botanical organizations and be better received by Congress.

Perhaps greater than the need for a botanical garden is the need in Hawaii for the preservation of natural areas through an expanded program of conservation by private, state, or national agencies. Away from the influence of man on cliff faces, mountain tops, and remote valleys, there is in Hawaii one of the world's most unique collections of native plants. The Hawaiian Islands, volcanic in origin, are two thousand miles from the nearest land mass. The present native Hawaiian vegetation developed from chance immigrants over a long period of time. Few equal and no better examples of evolution are to be found. Estimates of the number of plants found only in the Hawaiian Islands vary from four thousand to thirty thousand species, varieties, and forms. Based on the families and genera represented, one can estimate that about two hundred and seventy-five introductions gave rise by explosive evolution to the present flora of few genera and many closely related species. Isolated valleys and mountain tops, of which there are many, are localities for restricted species. Adjacent valleys have different species. Few species of native plants are wide spread. A study of how and why diversification of plant forms to create species takes place is possible in Hawaii and has scarcely been attempted. A full knowledge of the existing vegetation is lacking. Even basic exploration, collecting, and cataloguing are badly needed today. The population of Hawaii is growing. The demands for land are increasing. Civilization is taking its seemingly inevitable toll of natural areas. The need is immediate for the conservation of natural areas, to protect the components of the vegetation while we learn more about it.

Hawaii is the Aloha State, and the welcome is sincere. Few areas of the United States of America are as inviting or as rewarding to the visitor. Few areas offer greater horticultural and botanical opportunity.

At the Tenth Pacific Science Congress, on September 2, 1961, resolutions, approved by the Council of the Pacific Science Association, were adopted endorsing the establishment of a National Tropical Botanic Garden in the State of Hawaii and recommending to the authorities, both Federal and State, that they do all in their power to establish such a garden.

The Botanical Society of America, at its annual meeting on August 28, 1961, adopted resolutions endorsing the establishment of a National Tropical Botanic Garden in the State of Hawaii, expressing its willingness to cooperate in any studies in relation to its establishment, and respectfully requesting the passage of S. 772 and H.R. 5628 by the Congress of the United States. (These bills provide for a study of the feasibility and desirability of establishing a permanent National Tropical Botanic Garden in the State of Hawaii.)

The Garden Club of America, by action of its Executive Committee on October 10, 1961, adopted similar resolutions. The preamble to the resolutions follow:

"Whereas a politically stable repository under the Amer-

A sugar-cane (*Saccharum officinarum*) plantation in Hawaii.

ican flag where plants from all accessible parts of the world's tropics and subtropics may be preserved without fear of loss from frost, drought, or hurricane will benefit the nation in all the aspects of plant science; and

"Whereas botanists, assembled at the Fairchild Conference on Tropical Botany at the Fairchild Garden in 1960, expressed the need for further facilities for basic and applied research in tropical botany, horticulture, and agriculture; and

"Whereas preserving the collections of botanists and horticulturists, who roam the tropical world on specific projects, as living material will provide a foundation of genotypes which will be used by plant scientists from all tropical countries and aid in cementing a closer relationship with such countries and the United States."

Dr. Pierre Dansereau, Assistant Director (Botany) of The New York Botanical Garden, Dr. W. S. Stewart, Director of the Los Angeles Botanic Garden and Arboretum, Dr. J. L. Stebbins of the Department of Botany, University of California, Dr. Frits Went, Director of the Missouri Botanical Garden, were appointed members of a Visiting Committee of the Botanical Society of America by Dr. William C. Steere, Director of The New York Botanical Garden, on behalf of the Society. Dr. Dansereau, Dr. Stewart, and Dr. Went visited Hawaii in August, 1962, to conduct a feasibility survey and consult with the Hawaiian Botanical Gardens Foundations.

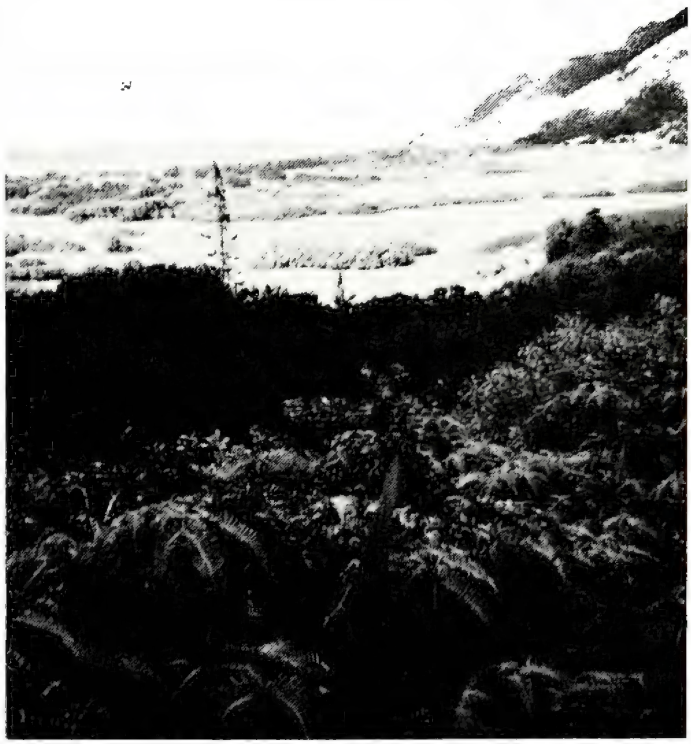
THE EDITOR

FOSTER BOTANICAL GARDEN (Continued from page 222)

spent $66,000 for construction in 1961), a proper entrance and parking area, administrative offices, library-lecture hall, a unique coolhouse for endemics, and display areas including an orchid garden and aquatic garden. Foster Botanical Garden will be primarily a display garden with an extensive educational program for the public. Construction on other sites in the future will provide more technical facilities. It is essential that the innovation of a local botanical garden be first related to and accepted by the bill-paying public. Once the gardens become an integral part of the community life, the expansion to more technical phases is assured. All planning at this time is concentrated on the popular phase.

Of the other garden sites the Lyon Botanical Garden within the caldera of Koko Crater will contain a dryland flora, the Walumalu Beach Garden will present a tropical strand collection, the Wahiawa and the not-yet-acquired site will contain the cool upland flora. The Kapiolani site is planted to the genus *Hibiscus*.

An additional and quite unique aspect of the new Botanical Gardens Division involves a serious and much-needed beautification project. The Division is responsible for designing, executing, and maintaining an Island-wide tree-planting program which involves several hundred miles of Oahu streets and roads. The influence and opportunity thus afforded cannot be underestimated. In practice, the botanical gardens will deeply affect the total aesthetic environment of Oahu, in providing for the planting of a great number of fine old and new plants. It is my hope that this influence can be extended eventually to schools and other public grounds. Dr. Lyon said that all Honolulu could



Kahana Valley, looking toward the sea. This is one of the sites proposed for a National Tropical Botanic Garden.

be a botanical garden—perhaps this will become a reality.

Foster Botanical Garden will remain the nucleus in which administration and planning will be centered for a chain of gardens. In its first phase, the Division will stress public education and display. In its second phase, a "Bailey-defined" botanical garden will emerge, and Hawaii will have a tropical botanical garden.

NEW ZEALAND REVISITED (Continued from page 219)

dium, and *Rhipogonum*), and great big clusters of epiphytes in the crowns (*Astelia, Collospermum,* and ferns). Maybe this can be compared to the mixed mesophytic of eastern North America: except for the beeches and a few southern vicariants of broad-leaved genera, almost all the podocarp and the dicotyledonous genera are represented.

Walk alone among the trees and let them speak. If your hand clings to the wet, twisting stem of the climbing fern and if your thigh rubs against the rough bark of the kauri, you will enter into the flow of time. There is no sun above, only the rich water falling through the crowns, filtering through the moss, channeled down the trunks into the plastic pink earth. And yet the power of many suns has shaken the very structure of these towering pillars, has drawn to it the salt of the earth gently exhaled by the lacy fronds of the tree ferns. The cycle of soil and water and air, the waste of leaf and flower and wood, the network of bees and birds, all merge into a great harmony that sings under your hand, that deafens your ear, that blinds your eye. This must be a beginning, not an end?

Not in a few hours can I gather the "objective data" that will fix this moving splendor and allow me to define it. Better to breathe it in, to fix it in the eye and the mind, to trust in superimposition of other images, maybe . . .

What are the kauris of New Caledonia like, by the way? How do they grow? Shall we go and see?

Students carefully observe as Mrs. Lillian Weber gives them preliminary instructions in seed sowing.

A young gardener follows her instructor's advice that tools must be thoroughly cleaned and hung in their proper places at the close of each class.

CHILDREN'S GARDENCRAFT

at The New York Botanical Garden

Six years ago fifty children were enrolled in the first class of the Children's Gardencraft at The New York Botanical Garden. This past spring more than three times that number—one hundred and seventy-two—registered for the course. This growth is indeed gratifying to the Garden and to its Educational Department. Planning and carrying out a program that will stimulate and hold the interest of lively nine- to sixteen-year-old youngsters require thought, time, and effort. Imagination and patience are also useful in handling this age-group.

Those who work with these productive gardeners find them responsive and enthusiastic. Their enthusiasm even extends to inquiring whether Sammy, who is only two years old, can have a garden plot. When told by one of the instructors that he would have to wait until he is nine years old, his brothers and sisters asked, "But will there be a place for Sammy then?"

The classes in Gardencraft begin in early March, and the students arrive warmly clad, protected against inclement weather. They meet on Saturday mornings until the end of the school term, then on week days through late August.

Newcomers are taught how to take care of gardening tools, how to prepare the soil, how to sow seeds, how to thin, and how to transplant little seedlings. The advanced students, those who have had instruction in previous years, are shown how to draw plans for their garden plots. They also package seeds under the supervision of Mrs. Lillian Weber, assist the other instructors with the beginners, and

With the soil nicely prepared, the students now measure and make furrows for sowing seeds.

Miss Hetty Everett, an instructor in the Gardencraft program, demonstrates transplanting to an attentive group.

The combined "drinking fountain-bathtub" for thirsty children and produce. All vegetables are washed before being placed in plastic bags or baskets to be carried home.

Cultivating, watering, and weeding continue, and the rows of vegetables respond to these good gardening practices.

This young gardener has settled himself comfortably on the ground, as he prepares to bag his broccoli and beans.

On Parents' Visiting Day, mothers and fathers examine the crops and express their sincere appreciation of the fine opportunity afforded their sons and daughters to learn something about gardening through the Gardencraft classes.

Gardencrafters stand in line to receive their certificates from Mrs. William C. Steere, assisted by Mrs. Lillian Weber.

Left. Marvin Berk, first-prize winner in the beginners' class for boys, tells the audience in the Lecture Hall what he thinks about Gardencraft.
Right. T. H. Everett leads Patricia Mullaney, one of the prize-winning monitors, to the microphone.

when a student is ill, take care of his garden.

The eager young gardeners work in pairs on seventy-seven plots, each measuring six feet by fifteen feet, growing such vegetables as carrots, broccoli, beets, lettuce, peppers, radishes, scallions, spinach, string beans, and tomatoes, and such flowers as marigolds and zinnias. The advanced students may also grow corn, cucumbers, eggplant, squash, and potatoes on trial plots; these plots are larger, six feet by twenty feet. The harvest is enjoyed by the Gardencrafters and their families—they carry home the fruits of their labors. Tons of vegetables and salad are produced: for example, 9,733 radishes; 2,030 scallions; 829 one-half heads of lettuce; 1,466 heads of lettuce; 620 pounds of carrots; 855 pounds of beets; 650 pounds of string beans; and 1,387 pounds of tomatoes.

Yes, 829 one-half heads of lettuce. Odd as this amount may appear, it is not a misstatement. The half-heads are proof of the sharing of the harvest of a given plot—even a radish has been cut in half to "share and share alike." A fine spirit of partnership develops, and there is little quarreling over "this is yours and that is mine."

Forty students are assigned to an instructor, who demonstrates only one operation at a time at the demonstration plot before the young students perform the operation on their garden plots. When a particular operation—be it sowing seeds or transplanting little plants, or watering or weeding—is completed, the instructor checks it before she demonstrates the next operation. Of course, the work is interrupted by numerous questions, most of them beginning with *why*.

The children's work is not only inspected, it is marked by a point system. Attendance, diligence, clean tools, good results, and so on add up to a maximum of ten points and bring the reward of a gold star at the end of the week. Absence, untidy tools, a rake left on the ground with its prongs up-ended, or some other fault—and points are deducted. Weeds, too, mean loss in points. War against weeds is continually waged in the garden plots, since a "harvest permit" is not posted on a plot unless it is free from weeds. Each young gardener is also responsible for weeding half of the walk around his plot.

At the graduation exercises on Saturday morning, September 29, 1962, one hundred and thirty-four received certificates because they had completed the course in Gardencraft in a satisfactory manner. Those who maintained better than average grades received books as prizes from the fund set up by Mrs. Herman M. Kurtz in memory of her brother Dr. Jacob Schnurr: Beginners (girls)—first prize, Irene Power; second prize, Linda Jacobs; and third prize, Yoke Bauer and Diane Galella. Beginners (boys)—first prize, Marvin Berk; second prize, Louis Morales; and third prize, Peter Mullaney. Advanced students—first prize, Marilyn Maiberger; second prize, Gloria Zeidberg; and third prize, Carmelina Ferreri. Monitors—Kenneth Foley and Patricia Mullaney. Mrs. William C. Steere presented the certificates and the prizes.

Mrs. Lillian Weber, Instructor in the Educational Department, welcomed the students and their relatives and friends. T. H. Everett, Assistant Director (Horticulture) and Senior Curator of Education, told the gathering of youngsters and adults about the children and flowers he had seen in Japan, China, India, and other foreign lands, and showed pictures he had taken of them on his recent trip around the world. Mr. Everett noted that some of the plants, *Hibiscus, Allamanda,* crotons, and bird-of-paradise could be seen in the Conservatory of The New York Botanical Garden—"in fact, the bird-of-paradise is blooming right now." Two of the young gardeners, Marvin Berk and Patricia Mullaney, told what they thought of the Gardencraft classes.

One father, on one of the Parents' Visiting Days, was overheard saying, "This is the greatest investment [the $3.00 registration fee] I've ever made."

The fee does not begin to cover expenses. The New York Botanical Garden estimates that a minimum of twenty-five dollars is expended annually for each child enrolled in the Children's Gardencraft.

Through "Friends of the Children's Gardens," $4,000 have been raised to assist in meeting these expenses. Mrs. John D. Beals, a member and a former chairman of the Advisory Council, and Mrs. Detlev Bronk, the wife of the President of Rockefeller Institute and also a member of the Advisory Council, are co-chairmen of this project.

Mrs. Beals approached Mrs. Martin Vogel, the former chairman of the New York Plant and Flower Guild, obtaining her permission to invite the members of this organization, which was dissolved last spring, to transfer their sup-

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BRIEF NOTES ON RECENT BOOKS

By ELIZABETH C. HALL

Miss Hall is Sarah Gildersleeve Fife Research Librarian of The New York Botanical Garden

GENERAL GARDENING

AN AMATEUR GARDENING BOOK OF GARDEN PLANS AND DESIGNS. Hellyer, A. G. L., ed. 128 pages, illustrated, indexed. Transatlantic Arts, Hollywood-by-the-Sea, Fla. 1962. $6.25.

Over a hundred different plans and designs with good perspective drawings accompanying the plans. Also illustrated and described are special garden features, such as gates, steps, seats, paths, and paving. American readers must be mindful that the plants suggested are selected for British gardeners and may not be hardy here.

GARDEN ART AND DECORATION. Editorial staffs of Sunset Books and Sunset Magazine. 96 pages, illustrated. (A Sunset Book) Lane Book Co., Menlo Park, Cal. 1962. Paper, $1.75.

Clever ways to embellish the garden with lighting effects, art objects, fence and wall decorations, ornamental paving and water displays. Also, suggestions for special settings for parties and festive occasions.

GARDEN HANDBOOK: 37 PROJECTS FOR HOME GARDENERS. 160 pages, illustrated. (Science and Mechanics Handbook No. 597) Science and Mechanics Publishing Co., Chicago. 1962. Paper $.75.

A useful how-to-do-it-yourself guide for the handy gardener. Numerous diagrams, planting lists, and carpenter's working drawings for garden structures.

HOW TO GROW AND USE ANNUALS. Editorial Staffs of Sunset Books and Sunset Magazine. 80 pages, illustrated (part colored), indexed. (A Sunset Book No. 306) Lane Book Co., Menlo Park, Cal. 1962. Paper, $1.95.

Especially useful features in this compact treatment of annuals are: the illustrations (a picture or more for each genus); the section on the use of color, including a color chart; the recommendations and descriptions of varieties; the table of average hard-frost dates for specific localities in the United States; and a pronouncing guide of botanical genera, species, and varieties.

MINIATURE PLANTS FOR HOME AND GREENHOUSE. McDonald, Elvin. 273 pages, illustrated, indexed. D. Van Nostrand Co., Princeton, N. J. 1962. $5.95.

The Editor of *Flower and Garden Magazine* discusses a way of gardening for those with limited space problems. Descriptions and cultural directions are given for more than eight hundred miniatures defined by the author as plants which mature or may be maintained, by pruning and training, at less than ten inches overall height. There is a very helpful list of commercial sources for plants and equipment.

OUTDOOR GARDENING IN POTS AND BOXES: A USEFUL GUIDE TO GROWING PLANTS IN ALL KINDS OF CONTAINERS. Taloumis, George. 235 pages, illustrated (part colored), indexed. D. Van Nostrand Co., Princeton, N. J. 1962. $5.95.

Growing plants in pots, boxes, and other containers is a popular kind of gardening for terraces, roof gardens, and for small, constricted areas. The former editor of *Horticulture* offers a wide variety of suggestions. His photographs, several of which he took in Europe, are especially fine.

PERCY THROWER'S PICTURE BOOK OF GARDENING. Thrower, Percy. 160 pages, illustrated, indexed. Transatlantic Arts, Hollywood-by-the-Sea, Fla. 1962. $4.50.

The Superintendent of Parks at Shrewsbury, well-known in Great Britain for his gardening demonstrations over BBC television, presents fundamental gardening operations through the medium of over six hundred and fifty exceptionally clear photographs and brief running text. He includes important techniques, such as sowing, planting, propagating, disbudding, lawn building, maintenance, and construction of rock gardens, dry walls, and pools.

THE SATURDAY MORNING GARDENER: A GUIDE TO EASY MAINTENANCE. Wyman, Donald. 236 pages, illustrated, indexed. The Macmillan Co., New York. 1962. $7.50.

One of America's leading horticulturists has heard the universal cry of despair of the harassed weekend garden-slave and offers sage advice on the selection and care of low-maintenance bulbs, perennials, vines, shrubs, and trees.

TACKLE YOUR NEW GARDEN THIS WAY. Lewis, W. H. 120 pages, illustrated. (Tackle Series) Sportshelf, New Rochelle, N. Y. 1962. $3.75.

Authoritatively written for the beginning British gardener. Some of the cultural practices recommended are not timed for our American growing season.

SPECIAL KINDS OF PLANTS AND GARDENING

THE CAMELLIA BOOK. Threlkeld, John L. 204 pages, illustrated (part colored), indexed. D. Van Nostrand Co., Princeton, N. J. 1962. $7.75.

The camellia has a most enthusiastic and optimistic supporter in the person of John L. Threlkeld who was superintendent of the Descanso Gardens in La Canada, California, for ten years, and was in charge of its collection of more than 100,000 specimen camellia plants. His book has an amazing amount of information, with chapters on camellia history, culture, hardiness, hybridizing, and propagation; descriptions of species and varieties; list of camellia clubs of the world; and names and addresses of important camellia plantsmen in the United States and abroad.

CARNATIONS FOR EVERYMAN, 5th ed. Allwood, Montagu C. 120 pages, illustrated (part colored), indexed. St. Martin's Press, New York. 1962. $3.95.

This standard British work, originally published in 1931, appears in a fifth, revised edition.

GLADIOLI AND THE MINIATURES. Genders, Roy. 144 pages, illustrated (part colored), indexed. St. Martin's Press, New York. 1962. $4.95.

A well-known British authority gives full notes on gladiolus culture, and descriptions and evaluations of several hundred varieties, including many that have originated in the United States and Canada.

MAKING AN ORCHARD; FOR HOME FRUIT GROWERS. Hughes, Cledwyn. 120 pages, illustrated, bibliography, indexed. St. Martin's Press, New York. 1962. $3.50.

Here is a good guide for British gardeners. Unfortunately, many of the varieties of the fruits and of the proprietary fertilizers and pesticides are not available in the United States.

MINIATURE CHRYSANTHEMUMS AND KOREANS. Genders, Roy. 100 pages, illustrated (part colored), indexed. St. Martin's Press, New York. 1962. $4.50.

Another of Mr. Genders' excellent little books. Just one reservation—it originated in Great Britain where the growing season does not always parallel the conditions found on this side of the Atlantic.

MONTH BY MONTH IN THE GREENHOUSE: A YEAR-ROUND GUIDE FOR THE CARE AND GROWING OF GREENHOUSE PLANTS, TOGETHER WITH A SCHEDULE OF GREENHOUSE OPERATIONS. Richards, Gomer. 239 pages, illustrated. Pageant Press, New York. 1962. $4.95.

Dr. Richards is a frequent visitor to the Library and greenhouses of The New York Botanical Garden, and those of us who know him have eagerly awaited the appearance of this splendid book on growing plants in the small, one-man greenhouse. His instructions have an individual touch—he writes from personal experience in his own little greenhouse. The wide variety of interesting plants covered is particularly good. To the busy physician who found time to write this practical and useful greenhouse guide—congratulations.

ORCHIDS. Blowers, John W. 129 pages, illustrated (part colored), indexed. St. Martin's Press, New York. 1962. $4.95.

The ever-increasing popularity of orchid growing among amateurs is evidenced by the orchid clubs and societies that have recently been organized. The editor of Britain's oldest periodical on orchids, *The Orchid Review*, gives in this present little book practical information for the beginning orchid grower; some orchid botany; how to start a collection; cultural instructions for cymbidiums, cattleyas, cypripediums, odontoglossums, and other related orchids; a chapter on pests; and a final section on orchid uses—arrangements and corsages and exhibiting at flower shows.

PRIMROSES. Genders, Roy. 171 pages, illustrated (part colored), indexed. St. Martin's Press, New York. 1962. $4.75.

The author, an enthusiastic grower of over

two hundred varieties of primroses, writes of his favorite flower—its literary associations, its history, and most of all, its culture. He also evaluates many of the species and varieties that he grows in Great Britain.

TROPICAL PLANTS AND THEIR CULTIVATION. Bruggeman, L. 228 pages, colored illustrations, indexed. (A Studio Book) The Viking Press, New York. 1962. $12.00.

A re-issue of the 1957 edition. 292 full-color illustrations. Translated from the Dutch publication *Tuinboek voor de Tropen*.

ROSES. Bois, Eric. 128 pages, 60 colored plates. Thomas Nelson and Sons, New York. 1962. $17.50 until Dec. 31; $20.00 thereafter.

A beautiful work in format and color reproduction. The superb paintings of outstanding, popular roses are the work of Mademoiselle Anne-Marie Trechslin. The accompanying text is by a European rosarian of note, Monsieur Bois, who created the Geneva Rose Garden. He presents a fine study of the many aspects of the rose—its history, symbolism, uses, classification, culture, propagation, judging, hybridization—and gives good descriptions of about two hundred varieties with the names of breeders and dates of introduction. An ideal gift book.

FLOWER ARRANGEMENTS

THE ART OF FLOWER PRESERVATION. Condon, Geneal. 61 pages, illustrated (part colored). (A Sunset Book) Lane Book Co., Menlo Park, Cal. 1962. Paper, $1.95.

Many will remember this author's article on flower preservation that appeared in the September, 1958, number of the *National Geographic Magazine* and her gold-medal exhibit the same year at the International Flower Show. In the present excellent booklet, Mrs. Condon describes the three basic preservation techniques, and there are added chapters on stem and foliage handling. In the final section, entitled "Flower Preserver's Encyclopedia," she offers specific instructions for drying one hundred and seventy-five different plants.

THE ART OF TABLE SETTING AND FLOWER ARRANGEMENT. Hirsch, Sylvia. 152 pages, illustrated (part colored), indexed. Thomas Y. Crowell Co., New York. 1962. $7.95.

Long overdue is this stimulating work on appointments and arrangements conducive to gracious dining. Mrs. Hirsch, in response to the urgings of colleagues and students, has put in book form some of the demonstrations and advice she employs in her lectures. The material is well organized and inspiring. Her "compatible menus and settings" are truly tempting.

A COMPLETE GUIDE TO FLOWER ARRANGEMENT. Fort, Victoria P. 224 pages, illustrated (part colored). The Viking Press, New York. 1962. $15.00.

It often seems that the number of flower arrangement books has reached the saturation point, and then comes a beautiful book, such as this one, which surely merits a place in a flower lover's library. It possesses quality in format, printing, and photographic reproduction, and it has an informative text by an experienced lecturer, exhibitor, and judge.

THE DRIED-FLOWER BOOK: A GUIDE TO METHODS AND ARRANGEMENTS. Carico, Nita C. and Jane C. Guynn. 128 pages, illustrated (part colored), indexed. Doubleday and Co., Garden City, N. Y. 1962. $4.95.

Numerous techniques for drying and preserving flowers and leaves and for creating "dried" arrangements are clearly discussed and illustrated by two Virginians who are past masters of this intriguing craft. Specific requirements and uses of some one hundred and fifty different plants are noted.

JAPANESE FLOWER ARRANGEMENT FOR BEGINNERS. Powell, Nina C. 96 pages, illustrated, bibliography. Charles Scribner's Sons, New York. 1962. $3.50.

Mrs. Powell, a graduate of the Ohara School of Ikebana, offers a simple introduction to the five basic styles of Moribana, together with a brief background history of Japanese floral customs and traditions.

NEW TECHNIQUES WITH DRIED FLOWERS. Whitlock, Sarah and Martha Rankin. 32 pages, illustrated (part colored), indexed. Hearthside Press, New York. 1962. $2.50.

A concisely written guide on the preservation of flowers and leaves with special emphasis on the new silica-gel treatment. Other media discussed are glycerine, borax, cornmeal, sand, and perlite.

TREES AND SHRUBS

MAKE FRIENDS OF TREES AND SHRUBS. Guillet, Alma C. (Foreword by H. W. Rickett). 285 pages, illustrated, indexed. Doubleday and Co., Garden City, N. Y. 1962. $4.50.

For over twenty years the author has been a frequent user of the Garden's Library and Herbarium, and it has been the privilege of our staff to watch the growth of this book with its exquisitely detailed drawings of over five hundred trees and shrubs (native and introduced). The need for an up-to-date descriptive guide to the woody plants of New York City's Central Park, where Mrs. Guillet conducts her popular nature-study walks, prompted her to write and illustrate the present volume.

MANUAL OF THE TREES OF NORTH AMERICA (EXCLUSIVE OF MEXICO), 2nd corrected ed. Sargent, Charles Sprague. 2 vols. 910 pages, illustrated, indexed. Dover Publications, New York. 1961. Paper, each volume $2.00.

Charles Sprague Sargent is one of the great names in North American tree literature. This paperback edition of his great Manual, covering 185 genera and 717 species of trees, with 783 fine line drawings, has excellent identification keys.

REGIONAL SILVICULTURE OF THE UNITED STATES. Barrett, John W., ed. 610 pages, illustrated, bibliographies, indexed. The Ronald Press Co., New York. 1962. $12.00.

A most thorough and well-documented appraisal of eleven of the forested areas of this country, and an evaluation of regional silvicultural practices. Each regional chapter has been written by an authority, who is resident in the area under discussion.

TREE GROWTH. Kozlowski, Theodore T., ed. 442 pages, illustrated, bibliagraphies, indexed. The Ronald Press Co., New York. 1962. $12.00.

Twenty-seven papers presented at the International Conference on Forest Tree Growth, held during April 1-10, 1960, at the University of Arizona in Tucson. Extensive coverage of the subject includes measuring methods, environmental effects, tree-ring dating, and physiological aspects of mycorrhizae.

REGIONAL BOOKS

AGRICULTURE AND LAND USE IN GHANA. Wills, J. Brian, ed. 504 pages, illustrated, 4 folding colored maps, bibliography, indexed. Published for the Ghana Ministry of Food and Agriculture by the Oxford University Press, New York. 1962. $10.10.

This massive, well-documented volume of twenty-six chapters, written by "senior civil servants, scientific research staff, and university lecturers in Ghana," is a valuable contribution to the literature of Ghanian climatology, geology, agronomy, ecology, forestry, agriculture, and animal husbandry. Fifty pages are devoted to a comprehensive bibliography.

ATLAS OF THE BRITISH FLORA. Perring, F. H. and S. M. Walters. 432 pages, maps, bibliography, indexed. Thomas Nelson and Sons, New York. 1962. $22.50.

A stupendous work in size and in content—includes distribution maps of 1,700 flowering plants and ferns, native or naturalized in the British Isles, and twelve transparent overlays of climate, topography, and geology. This project was sponsored by the Botanical Society of the British Isles.

CANADIAN AGRICULTURE IN WAR AND PEACE: 1935-50. Britnell, G. E. and V. C. Fowke. 502 pages, illustrated, bibliography, indexed. Stanford University Press, Stanford, Cal. 1962. $8.75.

An important contribution to the history of Canadian agriculture by two professors long associated with the Department of Economics and Political Science at the University of Saskatchewan. A general background study of the agricultural regions, climate, agricultural products, and their regional distribution, together with authoritative interpretations of government policies during World War II and in the early post-war years.

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BOOKS FOR CHRISTMAS

Books are a happy choice for Christmas gifts—a reminder of your thoughtfulness the year round.

Books reviewed in the pages of *The Garden Journal*, or any book on botany, gardening, flower arrangement, natural science, or kindred subjects may be ordered through Book Service.

Members are entitled to a ten per cent discount on the list price. Please send check or money order payable to The New York Botanical Garden with your order.

NEWS, NOTES and COMMENTS

The Garden's Educational Program. New features have been added to the Educational Program for the 1962-63 season. Among the new courses are a Two-Year Course in Landscape Gardening, a course in the "Art of Bonsai," and three Special One-Day Courses.

To meet a demand for instruction by home owners, young nurserymen, and others in the principles and practices of landscape gardening, the new two-year course is being added. It consists of six terms, and students may enroll at the beginning of any term. Those who complete all six terms satisfactorily will be awarded certificates. The first term of eight weekly two-hour sessions, which started on October 2, 1962, was over-subscribed.

The new course in the "Art of Bonsai" appeals to the ever increasing number of gardeners eager to learn the techniques practiced by the Japanese in developing miniature trees and landscapes in shallow containers. Registrations for the six weekly sessions that started October 11, 1962, exceeded the number that could be accommodated. The instructor is Yuji Yoshimura, well-known and distinguished lecturer and teacher of the Japanese gardening arts.

The three Special One-Day Courses are "Chrysanthemums and Other Perennials," which was given on October 24, 1962; "House and Small Greenhouse Plants" to be given on January 9, and "Flowering and Berried Trees and Shrubs" on April 17, 1963. Each of these three courses consist of two lectures, usually accompanied by slides, living plants, or demonstrations, and followed by a round-table discussion and a question and answer period.

Besides these new courses a substantial program of other instruction in botany, gardening, and allied subjects is offered by The New York Botanical Garden. The Two-Year Course in Botany and the Two-Year Course in Practical Gardening have been given since 1934. The Two-Year Course in Botany opened the fall, 1962, term with "General Botany I." Students may attend either the twelve morning or the twelve evening sessions.

The Two-Year Course in Practical Gardening began in September, 1962, with twelve weekly sessions on "Cultivation of Trees and Shrubs." Again the students have the choice of the morning session or the evening session.

The Saturday Afternoon Conducted Walks, initiated this past spring, proved so popular that they were resumed this fall. The walks start at one o'clock from the Museum Building at The New York Botanical Garden, the time being set to allow those who wish to do so, to enjoy the Saturday Afternoon Free Lecture Program at three o'clock in the Lecture Hall.

Activities of Director and Staff. During October Dr. William C. Steere, Director, gave a talk before the Englewood, New Jersey, Garden Club; attended the inauguration of Dr. James McNaughton Hester as President of New York University, the annual meeting of the New York State Association of Museums held at Corning, and a meeting of the Board of Managers of the Morris Arboretum at Chestnut Hill, Pennsylvania; and served on a panel to discuss museum resources at the ninety-first convocation of the New York State Board of Regents at Albany. Dr. and Mrs. Steere were in Europe for two weeks in October, visiting botanical institutions and gardens at Kew and Cambridge, England, at Utrecht, The Netherlands, at Munich, Germany, and at Copenhagen, Denmark.

Dr. Pierre Dansereau, Assistant Director (Botany) spent June and July in field research on vegetation of the Gaspé Peninsula. In August he attended the meetings of the American Institute of Biological Sciences at Corvallis, Oregon. He presented a report both before the Council and a general meeting of the Botanical Society of America, also held at Corvallis, on his recent visit to Hawaii to advise the Hawaiian Botanical Gardens Foundation on a national tropical botanical garden. Dr. Dansereau is chairman of a visiting committee appointed by Dr. Steere on behalf of the Botanical Society for this purpose. In September, Dr. Dansereau participated as a panelist in the annual seminar of the National Federation of Canadian University Students at Carleton University, Ottawa, on the role of the university professor in modern society. In October, he began a course at Columbia University on "Vegetation of the World."

Dr. Dansereau attended the meetings of the Association of American Geographers, New York-New Jersey Section, held at Sagamoor, New York, October 5-7, 1962. Interest centered on geographic and land conservation problems, especially in the Adirondacks.

Dr. H. W. Rickett, Bibliographer and Senior Curator of the Library, spent two days in September in the Farlow Herbarium of Cryptogamic Botany and the Gray Herbarium, both of Harvard University, Cambridge, Massachusetts, on bibliographic research connected with issues of *Memoirs* of *The New York Botanical Garden* and *North American Flora* in preparation.

Robert Jones, Administrative Librarian, attended the meeting of the Bibliographical Society of America, held in Boston on October 18, 1962. He visited libraries in the area, including the library of the Massachusetts Horticultural Society in Boston and of Arnold Arboretum in Cambridge, and attended the Fall Flower Show in Horticultural Hall, Boston.

Helen McMorris, wife of Dr. Trevor C. McMorris, was appointed Assistant Librarian in charge of serials and exchanges, effective September 15, 1962. Mrs. McMorris came to the Garden from the University of Western Ontario, London, Canada, where she was Serials Librarian.

Dr. Bassett Maguire, Head Curator and Coordinator of Tropical Research, made arrangements while in Surinam for an expedition of The New York Botanical Garden to the Wilhemina Mountain beginning in July, 1963. After visiting São Paulo and Rio de Janeiro, Dr. Maguire stopped at several places along the coast of Bahia and the northeastern states of Brazil. He joined Dr. Julian Steyermark, of the Instituto Botánico, Caracas, for several weeks of collecting in Venezuela before departing for New York the fore part of October, 1962.

In Dr. Maguire's absence Dr. Howard Irwin was in charge of the Herbarium. Several thousand new genus covers were prepared, typed, and inserted, and recent South American collections in several families were sent to specialists for determination. Preliminary arrangements were made for the arrival of four new graduate students. Dr. Irwin, who joined the Garden's staff in July, 1960, as a Research Associate, was made an Associate Curator effective July, 1962.

The three graduate students who recently joined the Herbarium's staff are Noel Holmgren from Utah State Agricultural College, Logan; Hyrum Johnson from Brigham Young University, Provo, Utah; and June Wetherell from the University of Wyoming, Laramie.

The fourth graduate student is João Salvador Furtado, who has been assistant to Dr. Alcides Teixeira at the Instituto de Botánica, São Paulo, Brazil. Mr. Furtado arrived at the Garden the first week in August, 1962, and will engage in research on the ganodermoid polypores in the Cryptogamic Herbarium, while working toward a Ph.D. degree at Columbia University.

Dr. Caroline Allen, Research Associate, returned to the Garden the first week in September, having spent three and a half months in Latin-American countries in research on tropical members of the *Lauraceae*.

Dr. Clark T. Rogerson, Curator of the Cryptogamic Herbarium, participated in the Charles Horton Peck foray the first weekend in September, two hundred miles north of Toronto.

Mary Fleming, Technical Assistant in the Cryptogamic Herbarium, talked before the Philadelphia Chapter of the American Rhododendron Society on October 11, 1962—her topic, "The Use of the *Ericaceae* in the Home Garden."

Dr. David J. Rogers, Curator of Economic Botany, served as chairman of the symposium on quantitative systematics at the Missouri Botanical Garden, St. Louis, on October 19, 1962. This annual symposium on various phases of taxonomy is sponsored by the National Science Foundation.

Dr. P. P. Pirone, Senior Plant Pathologist, was selected by Danielle Levesque for a story about a career in plant pathology. Miss Levesque, a staff writer for *Dairymen's League News*, New York City, is doing a series of articles for this publication on careers in agriculture in order to interest high school students in agricultural areas of the Northeast.

Dr. Pirone's son, Thomas, Assistant Professor of Plant Pathology at Louisiana State University, is co-discoverer with F. Malekzadek, a graduate student, of Teheran, Iran, of an antibacterial substance extracted from cauliflower seeds. According to a report in *Science Newsletter*, September 15, 1962, this substance is active against a number of bacteria causing plant diseases, as well as against some bacteria causing human diseases.

Dr. David Davis attended the Wilt Disease Conference at Oregon State University, Corvallis, Oregon, in August, 1962, and the meetings of the American Institute of Biological Sciences also held at the University in August, 1962. Dr. Davis presented two papers: "Physiology of Selective Pathogenicity in *Fusarium oxysporum* and "The Role of Naturally Occurring Fungitoxicants in Selective Pathogenicity of *Fusarium Oxysporum*."

Dr. Trevor McMorris, Research Associate, attended the meetings of the American Chemical Society, held in Atlantic City, New Jersey, in September, 1962.

Dr. Elsa O'Donnell, Visiting Research Associate, has received a grant for the third con-

secutive year from the Damon Runyon Memorial Cancer Fund for support of her research in neucleoli. Dr. O'Donnell presented a paper on "Neucleolar Ultrastructure: *Euglena gracilis*" at the second annual meeting of the American Society for Cell Biology held at San Francisco, California, the first week in November.

Sydney Gould, Research Associate, and his staff have completed the *International Plant Index*, Volume I. This is the result of a pioneer venture and a new departure in the field of botany—the large scale application of data-processing tools and techniques to the handling, ordering, and presenting of plant names. It is being carried out under a grant from the National Science Foundation to The New York Botanical Garden.

In this first volume, Mr. Gould and his staff present the names of the families of the Plant Kingdom in several different arrangements to suit the special need of the user. The information about the author of each name and the date and place of its publication add still greater value to the *Plant Index*.

Louis P. Politi, Horticulturist, had a full schedule on his recent European trip—he was in four countries within five days—visiting botanical gardens and nurseries. Mr. Politi was particularly impressed with the beautiful botanical garden at Munich and the Royal Botanic Gardens at Kew and with their extensive and varied plant collections. Mr. Politi was a judge at the September Flower Show of the 59 Maiden Lane Club in New York City.

John Swan, Foreman of the Arboretum, was a judge at the September Flower Show of the Socony Mobil Company's headquarters in New York City.

Dorothy Ebel Hansell, Editor of *The Garden Journal*, was a judge at three shows in September: the flower, fruit and vegetable show of Grange 181, Passaic Township, New Jersey; the nineteenth annual flower, fruit, and vegetable show of the Royal-Globe Insurance Group in New York City; and the forty-eighth annual dahlia show sponsored by the Dahlia Society of New Jersey and the American Dahlia Society at Garden State Plaza, Paramus. Mrs. Hansell attended the annual meeting of the Garden Writers Association of America on October 25 and 26, 1962. The program included a horticultural journalism seminar at the University of Maryland, visits to the Crops Research Station of the United States Department of Agriculture, at Beltsville, Maryland, the United States National Arboretum, Glenn Dale, and other points of interest. On October 27, she attended the annual meeting and flower show of the National Chrysanthemum Society, U.S.A., Inc., held at the Shoreham Hotel, Washington, D.C.

Staff Appointment. Phil Clark, who has been Garden Editor of *The News*, Mexico, has been appointed Assistant to the Director (Public Relations) effective November, 1962. While in Mexico, Mr. Clark also engaged in public relations for the United Community Fund Drive of the American Community and for the annual Independence Day celebration of the American Society. He has lectured before garden clubs in Mexico and the United States and contributed articles on gardening topics to American and English publications. Mr. Clark served as Editor of *Horticulture* from 1957-1959 and a year as Garden Editor of *Living for Young Homemakers*.

Dr. William J. Robbins, Director Emeritus, is the chairman of a committee of the National Academy of Sciences to make recommendations, at the request of Secretary of the Interior Stewart L. Udall, on the feasibility of an expanded long-range program of national history in the Park Service, with particular reference to more efficient management, development, interpretation of the National Parks, and their greater use by scientists for basic research.

Peter M. Glass, a graduate of Princeton University, where he worked under Dr. J. T. Bonner, was awarded the Gertrude S. Burlingham Scholarship in Mycology at The New York Botanical Garden the summer of 1962. His research program deals with zygotropism in *Mucor hiemalis*. He used the facilities of the Research Laboratory from June until September.

Honor to Dr. Becker. A new genus and species of the *Rhexoxylon* group has been named *Hermanophyton kirkbyorum*—the genus in honor of Dr. Herman Becker, Research Associate of The New York Botanical Garden, the species in recognition of Mr. and Mrs. Sam Kirkby of Riverside, California.

The description of the plant fossil, based on two pieces of a silicified stem resembling *Rhexoxylon* and photographs, is recorded by Dr. Chester A. Arnold of the Department of Botany, University of Michigan, Ann Arbor, in *American Journal of Botany*, Vol. 49, No. 8, September, 1962. One of the specimens was given to Dr. Arnold by Prof. Lyman H. Daugherty, of San Jose, California, the other by Mr. and Mrs. Kirkby. The photographs were taken by Dr. Becker, who accompanied Dr. Arnold on an expedition in 1953 to Hansen Creek in southern Utah, just west of the Henry Mountains.

In the party were four "rock hunters," men who hunt for minerals and fossils which they cut up, polish, and sell. There was an understanding that any specimens of scientific value were to be given to Dr. Arnold—or at least shared. The stem, in eleven pieces with a total length of eleven feet and tapering at both ends, was sighted by Dr. Arnold and Dr. Becker as they stood about one hundred feet above the Creek; at the same time it was seen by the four rock hunters. All six men spent better than an hour and a half digging the specimen out of the sandstone, above which it protruded two or three inches. But the rock hunters refused to live up to the agreement—they took the eleven pieces, and it is evident that they cut them up and sold them, two pieces eventually reaching Dr. Arnold.

Hermantophyton kirkbyorum resembles the genus *Rhexoxylon*, which was reported from three places in South Africa many years ago and more recently from South America, except that the "anomalously developed vascular tissue in the pith, an important generic characteristic of that genus is lacking." Because of this and because of the wide geographic and stratigraphic separation, Dr. Arnold has placed the Utah silicified stem in a new genus.

The 1962 Bulb Offer to members, sponsored by the Volunteer Associates of The New York Botanical Garden, was most successful. The sales were greater than in any previous year, since many members availed themselves of the opportunity to obtain fine bulbs for the garden and to support this fund-raising project for the Garden's programs of education, exploration, and research.

The cold weather—the coldest spring and summer that growers in Holland can recall—delayed the delivery of bulbs this fall. The flowering season normally ends in May; this year tulips were still flowering well into June. The continuing cold in June and July prolonged the life of the foliage, and since the foliage must ripen to produce good bulbs, the growers were compelled to delay harvesting—as much as three weeks in some parts of Holland.

Gustave Springer, the American representative of the Associated Bulb Growers of Holland, reports that the 1962 crop is one of the

Below. The silicified stem, eleven feet long, found in Hansen Creek in southern Utah.

Right. A cross section of the same specimen, identified and named by Dr. Chester A. Arnold—*Hermanophyton kirkbyorum*.

largest and best in Holland's bulb-growing history; and that the continuing cold weather, which slowed development, has had good effect on the quality of the bulbs.

Visitors to the Garden.

Joel Glazé, Rio de Janeiro, Brazil.

Jose de Jiménez, Santiago, Dominican Republic.

Dr. Sophie Schmitt, Camp Detrich, Md.

Dr. Luigi Califano, University of Naples, Naples, Italy.

Dr. Guiseppe Falcone, Institute of Microbiology, Rutgers University, New Brunswick, N. J.

Dr. Gaetano Salvatore, University of Naples, a visiting scientist at the National Institutes of Health and Welfare, Bethesda, Md.

Dr. Takezi Hasegawa, Director, Institute for Fermentation, Osaka, Japan.

Mrs. Randolph C. Guggenheimer, City Planning Commission, New York, N. Y.

Dr. A. S. Boughey, University College of Rhodesia and Nyassaland.

Dr. S. W. Hwang, American Type Culture Collection, Washington, D. C.

Dr. Stewart Kaufman, College of Pharmacy, Rutgers University, New Brunswick, N.J.

Dr. Ahmad S. Islam, Department of Botany, Cornell University, Ithaca, N. Y.

Dr. Alma T. Walker, Athens, Ga.

Miss Danielle Levesque, *Dairymen's League News.*

Mrs. Phyllis V. Parkins, *Biological Abstracts,* Philadelphia.

Dr. R. W. Richards, Manchester, England.

Dr. G. G. Lindeberg, Agricultural College, Vollebekke, Norway.

Dr. Emma G. Allen, Long Island University, New York.

Dr. M. J. Thirumalachar, Hindustan Antibiotics Research Center, Pimpri, Poona, India.

Dr. Yoshio Otani, Botanical Institute, Faculty of Agriculture, Hokkaido University, Sappora, Japan.

Dr. Anna Jenkins, Walton, N. Y.

Dr. Karl A. Silberschmidt and Gilda Varoli, Instituto Biologico, São Paulo, Brazil.

Dr. Franklin H. Perring, Director, Distribution Maps Scheme, University Botanic Garden, Cambridge, England.

Dr. F. B. Lamb, Tropical Forestry Expert, New York.

Dr. Margaret Fulford, University of Cincinnati, Cincinnati, O.

John L. Howard, Artist, *Scientific American.*

Dr. C. C. Williamson, Director Emeritus of the Libraries of Columbia University, and former Dean of the Graduate School of Library Service, New York, N. Y.

Rex Baird, Botany Department, University of North Carolina, Chapel Hill, N. C.

Ralph Bailey, Horticultural Editor, *House and Garden,* New York.

Rutherford Platt, author on trees.

James C. McCurrach, author, *Palms of the World.*

Mrs. Harriet K. Morse, author, *Gardening in the Shade.*

Jerry Eaton, Director, Westbury Gardens, Westbury, L. I.

Edward Mohlenhoff, Staten Island, N. Y.

Tecophilaea cyanocrocus violacea, a beautiful and unusual cormous plant from the Andes Mountains of Chile, was introduced this fall by Geo. W. Park Seed Co., of Greenwood, South Carolina. The funnel-form flower, about an inch long and opening to about an inch wide, is an intense blue, almost a gentian-blue, the throat veined or suffused white. This flower will have to be grown indoors in the North, since it is tender; it can be grown outdoors in southern gardens.

Geo. W. Park Seed Co. also announced the introduction of a new group of daffodils with fluted and ruffled cups—the Butterfly Hybrids.

'Bonanza Dwarf Peach', originated by Dr. David L. Armstrong, Director of Plant Research and the third generation in Armstrong Nurseries, Inc., of Ontario, California, culminates a scientific breeding-program that began in 1936. The new variety bears juicy, delicious, medium-sized, yellow-fleshed, freestone peaches on a bush three feet high. The bush requires little or no pruning; if left unpruned, it would reach a height of eight or ten feet after a number of years.

Its compact form, luxuriant green foliage, and exquisite flowers make an attractive specimen for ornamental planting. 'Bonanza Dwarf Peach' can also be grown in a container to be used on porch or patio.

Penn State Course on "Home Floriculture." To teach flower-growing for home gardeners, Penn State offers a correspondence course entitled "Home Floriculture." The nine lessons outline the choice varieties of annuals, perennials, roses, bulbs, and house plants and their cultural requirements. Included are seed-sowing and vegetative propagation methods. The last lesson is devoted to outdoor planters and window boxes, dish gardens and terrariums, and forcing bulbs. Study can be at the convenience of students, and examinations are optional.

The course is obtainable from Correspondence Courses, 202 Agricultural Education Building, University Park, Pennsylvania; the fee, $2.25. Checks are to be made payable to the Pennsylvania State University.

A container-grown specimen of 'Bonanza Dwarf Peach'.

Ecology at Rutgers. The first courses in ecology at Rutgers State University were taught at Douglass College shortly after Dr. John A. Small joined the college staff as botanist some thirty years ago. Formal study of ecology began at the Colleges for Men after World War II and within three years was being taught at the graduate level as well. The Rutgers Colleges at Newark and Camden added ecology to their programs within the last decade.

Since 1957 summer programs in ecology have been taught at New Brunswick with the aid of the National Science Foundation. They have been offered to teachers eager to strengthen and broaden their background in biology. This past summer more than forty secondary school teachers were selected from the long list of applicants for work in ecology.

At the graduate level, ecology forms a major part of the work of botanists, zoologists, and other related areas. The graduate degree, however, is not granted in ecology itself.

Mastery of ecological principles is essential to the thoroughly trained natural scientist, no matter what his specialty may be. Several members of the faculty in biological sciences contribute to the program in ecology: terrestial plant ecologist Dr. Murray F. Buell and terrestial animal ecologist Dr. Paul G. Pearson; marine biologist Dr. Harold H. Haskins; ornithologist Dr. Jeff Swinebroad; limnologist Dr. Francesco B. Trama; Dr. Small, and Dr. Edwin T. Moul.

Torrey Botanical Club held an open meeting and field trip at Boyce Thompson Institute for Plant Research in Yonkers, New York, on October 6, 1962; and on October 16, 1962, Dr. Gideon W. Schaeffer of Brookhaven National Laboratory, gave a talk on "Hormonal Interactions and Stress in *Nicotiana* Hybrid Tumor Development" at Fordham University.

The program for the next three meetings follows: November 20, 1962, Dr. John T. Bonner on "Recent Studies on the Development of Cellular Slime Molds;" December 4, 1962, Dr. Carl A. Price of Rutgers University on "Trace Elements: Site and Mode of Action in Plant Growth;" and December 18, 1962, Paul Bruce Dowling of The Nature Conservancy on "The Natural Area Movement and its Relationship to Science and the Community"—all in Schermerhorn Extension, Columbia University.

On January 15, 1963, the annual dinner and meeting will be held at the Men's Faculty Club, Columbia University. Dr. Lindsay Olive will give the Presidential Address.

Donald J. Martel, Head of the Department of Landscape Architecture, Oregon State University, received the Oregon State Federation of Garden Clubs Award, given annually to the person who has made the greatest contribution to horticulture in the State The citation mentioned his plant introductions, his plant breeding, his distribution of plants suitable for garden use, his lectures, writings, and instruction. Mr. Martel contributed an article on "Architectural Aspects of Plants" to *The Garden Journal,* September-October, 1962.

Aubrey Hunter MacAndrews retired July 1, 1962, from the State University College of Forestry at Syracuse University where he had been Professor and Chairman of the Department of Forest Entomology. In recognition of his thirty-six years of service, the Board of Trustees of the institution elevated him to Professor Emeritus of Forest Entomology.

Professor MacAndrews is a Canadian citizen by birth. While attending Truro College of Agriculture, Nova Scotia, from which he was graduated in 1922, he worked during the summer with the Canadian Forest Insect Division. In 1925 he received a B.S. degree cum laude, the following year a M.S. degree, both from Syracuse Forestry College. During these two years he also conducted studies for the United States Forest Service.

Professor MacAndrews has served as forest pest consultant to the United States Secretary of Agriculture—when Charles F. Brannon and when Ezra Taft Benson held this cabinet office. He has published widely and has been active in a number of Canadian and American entomological and horticultural organizations.

"Rosebrae," the terraced garden which he designed and built in 1931, is featured in *A Pictorial Guide to American Gardens*. Laid out on three distinct levels on a slope facing north and west, "Rosebrae" contains one thousand roses, rare trees, many irises, a rock garden, and a pool.

Professor and Mrs. MacAndrews have moved to Boulder, Colorado, where he plans to start a new rose garden and a garden of Colorado alpines. He will also work on a special Black Hills bark beetle control with Federal and State Agencies and start a collection of Colorado forest insects of major importance.

The Bedford Gardener's Almanac is a delightful publication filled with pertinent "Advice for Beginners and Reminders for the Experienced." Material that has been gathered by members of the Bedford Garden Club during its more than fifty years of existence—some of it published in the Club's bulletins—and new material contributed by friends make up the interesting content of this attractive paper-covered handbook. It may be obtained from the Bedford Garden Club, Bedford, N. Y., at $2.50 a copy, plus 25 cents for postage and handling. The proceeds are devoted to civic and club projects.

CHILDREN'S GARDENCRAFT

(Continued from page 230)

port of the children's gardens that had been maintained by the Guild at Rockefeller Institute to the children's gardens at The New York Botanical Garden. Mrs. Beals also appealed to members of The New York Botanical Garden to support these gardens through which an appreciation and understanding of horticulture are instilled at an early age.

The classes of annual contributions follow:

annual contribution to share in the maintenance of a Children's Garden	$ 10.00
annual contribution to support one child's gardening activities	25.00
annual contribution to maintain one Children's Garden	50.00
annual contrbution towards an endowment for the Children's Gardens	...

A "Friend of the Children's Gardens" may designate the name of a child or person in whose memory he wishes the contribution to be listed. Checks should be made payable to The New York Botanical Garden.

The Advisory Council of The New York Botanical Garden has shown interest in the Children's Gardens and gave the irrigation system, which helped so much this past dry summer to produce "bumper" crops, and the fence that encloses the area and protects the garden plots from vandalism.

BOOK REVIEWS (Continued from page 232)

COMMON SEASHORE LIFE OF THE PACIFIC NORTHWEST. Smith, Lynwood. 66 pages, illustrated (part colored), bibliography, indexed. (Naturegraph Ocean Guidebooks Vol. 2) Naturegraph Co., Healdsburg, Cal. 1962. Paper, $1.75.

A handy little guide to the seashore fauna and flora from Mendocino County, California, north to British Columbia and Vancouver Island. Mostly concerned with animal life.

THE ETHNOBOTANY OF PRE-COLUMBIAN PERU. Towle, Margaret A. 180 pages, illustrated, bibliography, indexed. (Viking Fund Publications in Anthropology No. 30) Aldine Publishing Co., Chicago. 1962. $6.00.

A scholarly, fully documented work on the rich botanical and ethnological findings from the Peruvian central Andes that date back more than two thousand years before the beginning of the Christian era. Invaluable source material for students of archaeology, anthropology, and economic botany, and fascinating information for non-specialist layman readers.

FLORA OF THE BRITISH ISLES, 2nd ed. Clapham, A. R., T. G. Tutin, and E. F. Warburg, 1,269 pages, bibliography, indexed. Cambridge University Press, New York. 1962. $13.50.

Since the writing of the first edition of this standard British Flora in 1952, there have been considerable new findings, especially among the alien plants that have become newly established or have failed to maintain their footing. The present thoroughly revised edition, completely reset in a new format, embodies the important results of taxonomic research of recent years.

FLOWERS OF THE HOLY LAND. Vester, Bertha Spafford. 64 pages, colored illustrations. (Hallmark Cards, Kansas City, Mo., 1962). Distributed by Doubleday and Co., Garden City, N. Y. $2.00.

A most exquisite little book of seventeen reproductions of watercolors painted by a much beloved and venerated lady—a modern Florence Nightingale—who has spent some eighty years in the Holy Land, serving and caring for the people in that country. Lord Allenby, who suggested that her paintings be put in a book, has written a charming introduction, and two other prominent personages, Lowell Thomas and Dr. Norman Vincent Peale, have contributed eloquent biographical notes on this remarkably gifted woman. A charming gift book.

GREAT SMOKY MOUNTAINS WILDFLOWERS. Campbell, Carlos C., William F. Hutson, Hershal L. Macon, and Aaron J. Sharp. 40 pages, colored illustrations, bibliography, indexed. University of Tennessee Press, Knoxville, Tenn. 1962. Spiral, $1.00.

Brief descriptive notes and photographs in natural color of fifty-five common wild flowers of Great Smoky Mountains National Park. A high percentage of the plants depicted are found in our northeastern and central states.

THE OBSERVER'S BOOK OF SEA AND SEASHORE. Evans, I. O., ed. 253 pages, illustrated (part colored), indexed. Frederick Warne and Co., New York. 1962. $1.25.

Number 31 of the popular British Observer's Pocket Series. Fine illustrations, in black and white and in color, and excellent text. Unfortunately, not all the plants and animals described are found in the United States.

POISONOUS PLANTS OF VENEZUELA. Blohm, Henrik, 136 pages, illustrated (part colored), bibliography, indexed. Harvard University Press, Cambridge, Mass. 1962. $9.00.

An outstanding publication in format, illustrations, and text. Each plant bears a taxonomic description, notes on the chemical nature of its poison, conditions of poisoning, symptoms, prophylaxis, and treatment. The bibliography contains 394 references.

PUFFINS. Lockley, R. M. 222 pages, illustrated, bibliography, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.25.

A noted British ornithologist and wild-life conservationist gives a brilliant account of his observations of the puffins and of the islands off the southwest coast of Wales where these birds breed and raise their young.

SOUTHERN PLANTATION: THE STORY OF LABRAH, INCLUDING SOME OF ITS TREASURED RECIPES. Heinsohn, Lillian B. 286 pages, illustrated, indexed. Hearthside Press, New York. 1962. $4.50.

Picturesque, autobiographical commentary on how an old southern plantation in Georgia was purchased and restored by a southern-born

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couple, whose ancestors had once known the gracious life of the Deep South. Mrs. Heinsohn has a gay, lilting, chatty way of telling her story which has many references to gardening, plants, and food (with priceless old southern recipes originating from her great grandmother's cook).

TROPICAL FORESTRY: WITH PARTICULAR REFERENCE TO WEST AFRICA. Taylor, Charles J. 163 pages, illustrated, bibliography, indexed. Oxford University Press, New York. 1962. $3.40.

A textbook for forest rangers in training, with particular consideration of West African silviculture, written by a silviculturist who for many years was in the Colonial Forest Service in Ghana. At present Dr. Taylor is lecturer in the Department of Forestry at the University of Edinburgh.

FOR YOUNGER READERS

ABOUT FORESTERS. Dobrin, Norma. 31 pages, illustrated (part colored). (Look, Read, Learn Series) Melmont Publishers, Chicago. 1962. $2.50.

The numerous and varied jobs of today's foresters are described in a lively manner.

ABOUT TRUCK FARMING. Johnson, Irma B. 31 pages, illustrated (part colored), indexed. (Look, Read, Learn Series) Melmont Publishers, Chicago. 1962. $2.50.

An elementary bird's-eye view of the busy life of an American truck farmer, from seed-sowing to the harvest.

THE ADVENTURES OF LEWIS AND CLARK. Bakeless, John. 183 pages, illustrated, bibliography, indexed. (North Star Books) Houghton Mifflin Co., Boston. 1962. $1.95.

Red-blooded boys and girls will revel in this latest exciting title of the fine series of North Star Books, which bear the slogan "Good History Makes Good Reading".

THE BIG DIG: A FRONTIER FORT COMES TO LIFE. Gringhuis, Dirk. 36 pages, colored illustrations, bibliography. The Dial Press, New York. 1962. $2.75.

The Big Dig is a very simply told story of the exciting "digs," which were found at old Fort Michilimackinac in Michigan and helped to recreate a picture of early eighteenth-century life in America.

FROM THE EAGLE'S WING: A BIOGRAPHY OF JOHN MUIR. Swift, Hildegarde H. 287 pages, illustrated, bibliography, indexed. William Morrow and Co., New York. $3.95.

The life of a rugged naturalist and conservationist who, more than any one person, inspired President Theodore Roosevelt to develop America's National Park System. Mrs. Swift has previously written several fine biographies for the young-adult set, including *The Edge of April; a Biography of John Burroughs* (1957).

FUN WITH FOSSILS: THE HOW, WHY, AND WHAT, FOR THE YOUNG AMATEUR COLLECTOR. Collin, Richard O. and G. Allen Stoiber. 42 pages, illustrated, indexed. Frank E. Richards, Phoenix, N. Y. 1962. Paper, $1.00; cloth, $2.50.

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There is a thrilling fascination in finding your first fossil. The authors have written this very elementary fossil primer for boys and girls, who want to learn some simple facts about fossils, where to find them, and how to prepare and label them.

THE GOLDEN BOOK OF GARDENING: HOW TO PLAN, PLANT, AND CARE FOR A HOME GARDEN. Giannoni, Frances and Seymour Reit. 69 pages, illustrated (part colored), indexed. Golden Press, New York. 1962. $1.99.

A most attractive and informative book on gardening for boys and girls, with a wealth of diagrams, picture maps of plant origins, illustrations in color of flowers, insects, fruits, vegetables, trees, and shrubs.

GUIDE FOR YOUNG CAMPERS. Lindholm, Mauno A. 192 pages, illustrated, indexed, Hart Publishing Co., New York. 1962. $3.95.

A Scoutmaster in Old Greenwich, Conn., has written an up-to-the-minute, fascinating manual for young campers. Illustrations and general format are very appealing. Chapter headings include hiking hints, trail marks, camping hazards, knot craft, outdoor cooking, fire building, outdoor shelter, first aid, identification of trees and poisonous plants.

HILLS AND HARBORS; THE MIDDLE ATLANTIC STATES. Wood, Dorothy. 93 pages, illustrated (part colored). (Enchantment of America Series) Childrens Press, Chicago. 1962. $3.50.

Another of the splendid series of regional titles which combine early and modern history, geography, handcrafts, and industries of each State. Stimulating, factual reading for fourth graders and up.

THE HOW AND WHY WONDER BOOK OF WILD FLOWERS. Ferguson, Grace F. 48 pages, illustrated (part colored). Wonder Books, New York. 1962. Paper, $.50.

A very good "first" book on wild flowers. Answers such questions as "what are plant families?" "what are the differences between the buttercup and rose families?" and "why are insects so important to flowers of the orchid family?".

HOW TO EXPLORE THE SECRET WORLDS OF NATURE. Brown, Vincent. 174 pages, illustrated, bibliography, indexed. Little, Brown and Co., Boston. 1962. $3.50.

The name of Vincent Brown is familiar to nature-study teachers and camp counselors who have used his nature leaflets and books. In his most recent title, written for the budding naturalist-explorer, he uncovers secret worlds to be found in the house and backyard, in the city and in the country, under ground and under water, in the sky and even in outer space.

LET'S FIND OUT ABOUT WATER. Shapp, Martha and Charles Shapp. 42 pages, illustrated (part colored). Franklin Watts, New York. 1962. $1.95.

Facts about the importance of water to animal and plant life. for the very, very young reader.

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LOGGING; THE STORY OF AN INDUSTRY. Taylor, Arthur S., Jack Sutton, and Bart Benedict. 64 pages, illustrated (part colored), indexed. (A Sunset Junior Book) Lane Book Co., Menlo Park, Cal. 1962. Paper, $1.95.

The "preteen" group will learn interesting forestry facts and figures from this well-illustrated account of lumber trees and their importance to man.

MERIWETHER LEWIS: BOY EXPLORER. Bebenroth, Charlotta M. 182 pages, illustrated. The Bobbs-Merrill Co., Indianapolis. 1962. $2.25.

As a youth, Meriwether Lewis often visited his neighbor at Monticello, Thomas Jefferson, who later commissioned him to lead an exploring party into our vast Northwest. This is a story which very young readers will find most exciting.

OF CABBAGES AND CATTLE; THE STORY OF AMERICA'S FARMS. Gringhuis, Dirk. 37 pages, colored illustrations. The Dial Press, New York. $2.95.

An account of the many kinds of American farms which supply us with meat, Milk and milk products, vegetables, fruits, and grains. For those from ten to twelve years of age.

SOILS

A BOOK ABOUT SOILS FOR THE HOME GARDENER. Ortloff, H. Stuart and Henry B. Raymore. 189 pages, maps, bibliography, indexed. M. Barrows and Co., New York. 1962. $3.95.

During the past forty years the gardens and books of the Long Island team of Ortloff and Raymore have attained an enviable reputation. The present offering is an elementary text on the complicated subject of garden soils. It has been written clearly and simply in non-technical language for the layman gardener.

SOIL MECHANICS. Jumikis, Alfred R. 791 pages, illustrated, bibliographies, indexed. (University Series in Civil Engineering and Applied Mechanics) D. Van Nostrand Co., Princeton, N. J. 1962. $12.50.

A comprehensive, technical textbook on the physical properties of soil, written primarily for construction engineering students and for those confronted with soil-performance problems. After each chapter are questions and problems and lists of references for further study.

FORAGE CROPS

FORAGES: THE SCIENCE OF GRASSLAND AGRICULTURE, 2nd ed. Hughes, H. D., Maurice E. Heath, and Darrel S. Metcalf. 707 pages, illustrated, bibliographies, indexed. Iowa State University Press, Ames, Iowa. 1962. $7.50.

A thoroughly revised edition of an important college reference textbook, which first appeared in 1951. The present work consists of sixty-four short chapters, each of which has been written by a specialist in a specific field. The questions following each chapter are particularly valuable for teachers and students.

DISEASES AND INSECTS

DISEASES OF TURFGRASSES. Couch, Houston B. 289 pages, illustrated (part colored), bibliography, indexed. Reinhold Publishing Co., New York. 1962. $10.00.

Diagnoses and controls of turfgrass diseases caused by pathogenic fungi and pathogenic nematodes thoroughly and expertly presented. Specific information made readily accessible under such subjects as symptoms, pathogens, hosts, disease cycles, controls, resistant varieties, trade names of basic chemicals, common and scientific names of grass species and of diseases. An important reference work.

HORTICULTURAL PESTS; DETECTION AND CONTROL. Wilson, George Fox. (3rd ed. revised by P. Becker) 240 pages, illustrated (part colored), indexed. Sportshelf, New Rochelle, N. Y. 1961. $6.75.

The original edition of this authoritative British work appeared in 1947 under the title *The Detection and Control of Garden Pests.* With extensive rewriting, enlarging, updating, and additional illustrations, the present third edition has been brought out by Dr. P. Becker who is Entomologist to the Royal Horticultural Society.

OUR GARDEN FRIENDS THE BUGS: WHO THEY ARE AND HOW THEY HELP US. Forbes, Allan W. 190 pages, illustrated, bibliography, indexed. Exposition Press, New York. 1962. $4.00.

"Bugs" to Allan Forbes, who is a dedicated nature lover and observer, include insects, spiders, worms, and other small animal life which live in his New England garden. He writes most entertainingly of his bug friends and frequently criticizes man for his indiscriminate spraying methods.

WEEDS

WEED DESTRUCTION: A FARMERS' AND STUDENTS' GUIDE. Evans, Stanley A. 172 pages, illustrated, indexed. F. A. Davis Co., Philadelphia. 1962. $5.50.

A very practical manual for British growers, offering detailed cultural and chemical methods of weed control. The illustrations of a wide variety of weeds in the seedling stage are excellent. Many of the proprietary products mentioned are not obtainable in this country.

CONSERVATION AND NATIONAL PARKS

THE NATIONAL PARKS OF THE UNITED STATES. Bolin, Luis A. 105 pages, illustrated, indexed. Alfred A. Knopf, New York. 1926. $3.95.

Informative descriptions and enthusiastic comments on our National Parks by a Spanish-born conservationist, who has visited thirty of them. Especially interesting are his observations concerning the traces of early Spanish explorers in many of the regions. The original text was translated from the Spanish by Herbert Weinstock.

SILENT SPRING. Carson, Rachel. 368 pages, illustrated, bibliography, indexed. Houghton Mifflin Co., Boston. 1962. $5.00.

One of the most discussed and controversial "out-door books" of 1962. It is deeply concerned with the conservation of wild life and with the upsetting of the "balance of nature" by man through the use of herbicides and insecticides. Miss Carson, an adept writer and able biologist, won public acclaim with her *The Sea Around Us,* published in 1951.

HISTORY AND EXPLORATION

THE EARLY SNUFF MILLS OF NEW JERSEY. Weiss, Harry B. and Grace M. Weiss. 117 pages, illustrated, bibliographies, indexed. New Jersey Agricultural Society, Trenton, N. J. 1962. Paper, $2.00.

The ninth of a series of valuable monographs on early New Jersey industries. Although this present title implies that its contents pertain only to New Jersey, there is a splendid chapter on snuff mills of neighboring states, including a fine description and early picture of the Lorillard Snuff Mill on the banks of the Bronx River.

FOLKLORE AND ODYSSEYS OF FOOD AND MEDICINAL PLANTS. Lehner, Ernst and Johanna Lehner. 128 pages, illustrated, indexed. Tudor Publishing Co., New York. 1962. 128, illustrated, indexed. $4.95.

Entertaining and informative popular accounts of the origins and curious histories of more than one hundred and fifty of our common drug, condiment, food, and drink plants, embellished with some two hundred reproductions from the early herbals. A companion volume to the authors' *Folklore and Symbolism of Flowers, Plants and Trees* which appeared in 1960.

THE HEATHENS; PRIMITIVE MAN AND HIS RELIGIONS. Howells, William. 302 pages, illustrated, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.45.

A popular classic now in a paperback edition. Plants often play an important part in many primitive religions.

THE HERITAGE OF THE BOUNTY, revised with a new postscript. Shapiro, Harry L. 301 pages, illustrated, bibliography, indexed. (The Natural History Library) Doubleday and Co., Garden City, N. Y. 1962. Paper, $1.25.

Professor Shapiro, who was a member of the 1934 Templeton Crocker expedition to the eastern Pacific, wrote the original text of this remarkable study of Anglo-Polynesian culture on Pitcairn Island shortly after his return to the United States in 1935. A revised edition now appears with an additional chapter entitled "Twenty-five Years Later"

THE NATURALIST OF THE RIVER AMAZONS. Bates, Henry W. 465 pages, illustrated, maps, indexed. University of California Press, Berkeley, Cal. 1962. Paper, $2.45.

This is the first paperback issue of the 1864 abridged edition of Bates's dramatic account of his trip up the Amazon—a thrilling natural history commentary, written when the author was in his enthusiastic twenties.

PRAIRIE WILDFLOWERS. Carmichael, Lloyd T. 186 pages, illustrated, indexed. J. M. Dent & Sons Ltd, Toronto, Canada. 1961. $3.00.

Regional wild flower manuals are very helpful for amateur identification. This book, arranged by blooming season, is no exception. Written to cover the Canadian prairies, it will serve as a guide to the American prairies as well.

Each species described is illustrated, but many of the illustrations do not adequately show the form of the flowers.

LYNETTE L. SCRIBNER

PERSIAN GARDENS AND GARDEN PAVILIONS. Wilber, Donald N. 239 pages, illustrated (part colored), bibliography, indexed. Charles E. Tuttle, Rutland, Vt. 1962. $12.50.

Oddly enough, this beautiful and learned book on Persian gardens has come from Japan and Rutland, Vermont. The author, Donald N. Wilber, is well fitted to treat the subject, for he is an architect and archaeologist, has lived in the Middle East, and is director of the Middle East Associates and chairman of the Board of Directors of the Iran Foundation. He has done extensive research in gathering his material. He quotes from Clavigo, a Spaniard, who was ambassador to Tamerlane in Persia in the early fifteenth century, and from Charles Chardin, a French jeweler, who traveled in Persia in 1674. Chardin enumerated the wild flowers he saw; among them, hyacinths, tulips, anemones, ranunculus, narcissi, lilies, lily-of-the-valley, jasmine, a clove pink, each plant having thirty flowers, and also irises, delphiniums, tuberoses, and many more. The flowers were depicted in paintings done somewhat stiffly, but in attractive compositions, also in embroidery and weaving. Mr. Wilber mentions garden carpets, two of which are in the Metropolitan Museum of Art. He also quotes extensively from the Persian poets who described gardens, among them Sa'di, Firdzawai, Hafiz, and Saba.

The book is organized into chapters, each telling about a period and a group such as gardens at the beginning, namely in 1396. Often there is a plan of the garden drawn by the author. Among the groups are Timurid and Isfahan in the Safafid period of the seventeenth century, and here there is a drawing of the Square called Maidan-i-sh ah. Pictured are buildings with slender columns and mosques with the most exquisite tiles ever made, and there is a color photograph of probably the most beautiful bridge in the world, the one across the Zayabdeh River. Gardens along the Caspian are shown, also those in Teheran and Shiraz, where are the lovely Bagh-i-Eram and Bagh-i-Gulshan, and handsomest of all, at least from the pictures, the Divan Khaneh. After reading this book, one is tempted to take the next plane to Persia and visit these exquisite gardens, mosques, and squares.

HELEN M. FOX
Mt. Kisco, N. Y.

LADY WITH GREEN FINGERS, THE LIFE OF JANE LOUDON. Howe, Bea. 184 pages, illustrated, bibliography, indexed. Transatlantic Arts, Hollywood-by-the-Sea, Fla. 1962. $7.50.

Bea Howe, a writer of horticultural articles as well as other subjects, takes us into the world of the early nineteenth century, of Sir Joseph Paxton, as well as such painters as Landseer and Millais, and such writers as Thackery and Dickens and Wilkie Collins, when she describes the life of Jane Loudon, who was their friend, a garden writer, wife of John Claudius Loudon, an outstanding writer and planner of gardens in his day.

Jane Loudon lived a short but fruitful life from 1807 to 1858. She appeals not only because of her gardening interests but for her courage in meeting financial and family problems after her husband died, and also because of her advanced ideas. Before her marriage she foretold, in her book *"Mummy,"* air travel, city planning and housing, and the abolition of prisons; and elsewhere wrote about distressed needle women and the plight of governesses. She innovated her garden costume, revolutionary in her day, consisting of a short skirt, a coverall, gloves, and a straw bonnet.

While her husband lived, she was his collaborator in writing as well as gardening. Her sister-in-law, who lived in the house next door in Bayswater, London, her cook, and her little daughter all worked together under the direction of John Loudon. They grew roses, lilies, mignonette, forget-me-nots, pansies, carnations, auriculas, hyacinths, which they forced by pouring hot water over them, and pansies. Jane Loudon liked old-fashioned border plants and did not admire the bedding plants popularized by Paxton. The greenhouse and plants are de-

(Continued on Inside Back Cover)

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scribed, as also a "Moss House."

Jane Loudon edited magazines and wrote twenty-three books, among them novels and poetry, one on botany for ladies, and others on British wild flowers and domestic pets.

Lady with Green Fingers is charming.

HELEN M. FOX
Mt. Kisco, N. Y.

LETTERS TO THE EDITOR

The article on mosses by Edwin H. Ketchledge in the current (July-August, 1962) issue of *The Garden Journal* pleased me very much. I have been doing some landscaping with mosses, ferns, and rocks which is quite fascinating.

ROBERT H. GAEDE
Saddle River Boro, N. J.

The research institutes belonging to Kebun Raya Indonesia were transferred in June, 1962, to the Department of National Research and are no longer under the direction of Sadikin Sumintawikarta.

S. MURJATI TJITRASOMA, Secretary
Department Pertanian,
Lembaga,
Pusat Penjelidikan Alam
(Kebrun Raya Indonesia)

This information was received too late to include in the September-October, 1962, issue of *The Garden Journal*, in which Mr. Sadikin's paper on "The Botanical Gardens in Indonesia" was published. THE EDITOR

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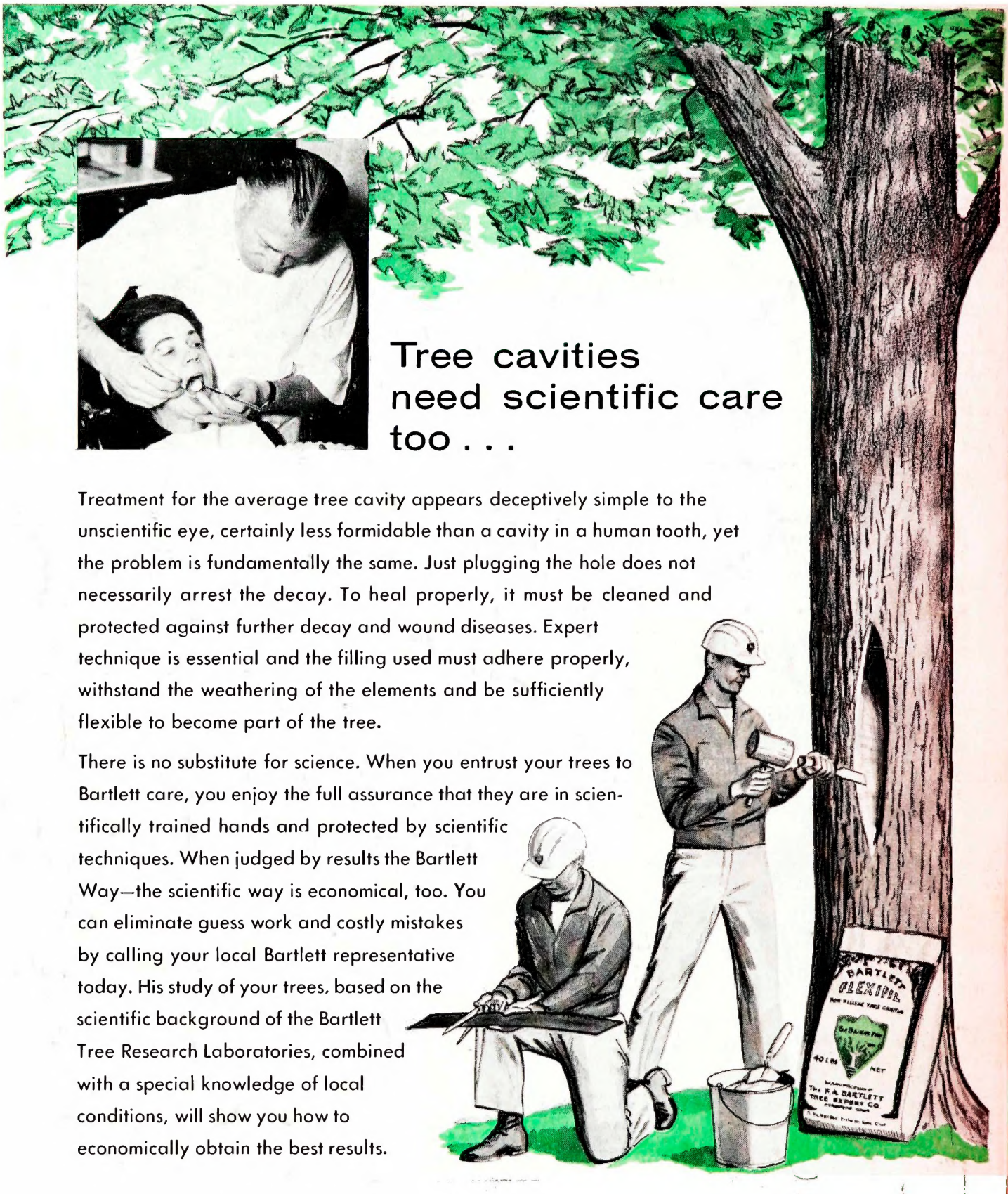

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